

***Final Staff Assessment  
(Part 1 of 3)***

**ELK HILLS  
POWER PROJECT**

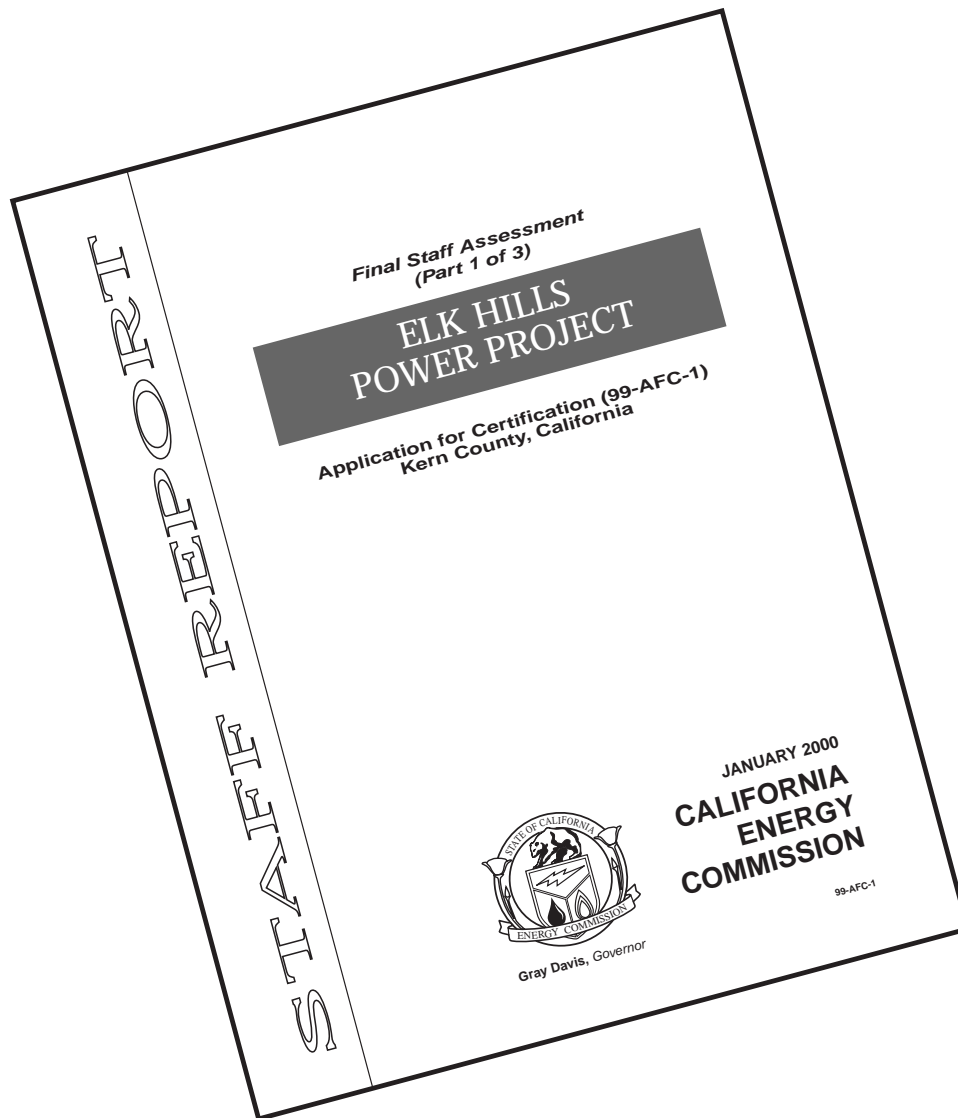
**Application for Certification (99-AFC-1)  
Kern County, California**



**Gray Davis, Governor**

**JANUARY 2000  
CALIFORNIA  
ENERGY  
COMMISSION**

**99-AFC-1**



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**CALIFORNIA ENERGY COMMISSION**

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**ENERGY FACILITIES SITING &  
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# **EXECUTIVE SUMMARY**

Marc S. Pryor

## **INTRODUCTION**

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This Final Staff Assessment (FSA) contains the California Energy Commission (Energy Commission) staff's evaluation of the Elk Hills Power, LLC's (referred to as "Elk Hills", "EHP" or "the applicant") Application for Certification (AFC) (99-AFC-1) for the Elk Hills Power Project (EHPP). The EHPP electric generating plant and related facilities, such as the electric transmission line, natural gas pipeline and water lines are under the Energy Commission's jurisdiction and cannot be constructed or operated without the Energy Commission's certification.

Staff is an independent party in the proceedings. This FSA is a staff document, presenting staff's independent analysis. It examines engineering and environmental aspects of the EHPP based on the information available at that time of document creation. The FSA contains analyses similar to those contained in Environmental Impact Reports required by the California Environmental Quality Act (CEQA). It is not a Committee document nor is the FSA a final or proposed decision on the proposal. The FSA presents staff's conclusions and proposed conditions that staff recommends apply to the design, construction, operation, and closure of the proposed facility, if certified.

## **BACKGROUND**

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On February 24, 1999, the applicant filed an AFC with the Energy Commission to construct and operate the EHPP. On June 9, 1999, the Energy Commission deemed the AFC data adequate, at which time staff began its analysis of the proposal. Energy Commission staff filed its Preliminary Staff Assessment (PSA), Part 1, on November 19, 1999, with the exception of Soils and Water Resources (PSA Part 2), which was filed on December 6, 1999.

The analyses contained in this FSA are based upon information from: 1) the AFC; 2) subsequent amendments; 3) responses to data requests; 4) supplementary information from local and state agencies and interested individuals; 5) existing documents and publications; 6) independent field studies and research; and 7) comments on the PSA. Comments on the PSA were received from the applicant and California Unions for Reliable Energy (CURE). Staff's has addressed, as necessary, these comments in the respective technical sections.

## **PROJECT DESCRIPTION**

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The proposed Elk Hills Power Project (EHPP) will be a nominal 500-megawatt (MW), natural gas-fired, combined cycle power plant located in the Elk Hills region of western Kern County. The site is about 25 miles west of Bakersfield, California, 9

miles south of the unincorporated community of Buttonwillow, California, and 9 miles north of Taft, California. The 12 acre site is a part of the 47,000 acre Elk Hills Oil and Gas Field operated by Occidental of Elk Hills Inc. (OEHI), formerly the Elk Hills Naval Petroleum Reserve Number 1. The site is currently occupied by out-of-service tanks and related equipment formerly used for the storage and loading of propane, butane, and natural gas liquid products.

Major features of the power plant are: two power trains, each comprised of one 153 to 166 MW Combustion Turbine Generator (CTG), one Heat Recovery Steam Generator (HRSG); one shared 171 MW Steam Turbine Generator (STG); and one six-cell cooling tower. Dry low NO<sub>x</sub> combustors will be used in each CTG. Each HRSG will be equipped with a Selective Catalytic Reduction (SCR) emission control system that uses anhydrous ammonia in conjunction with a fixed bed catalyst to reduce NO<sub>x</sub> in the CTG exhaust gases. The design of the power plant provides for operational flexibility. As planned by Elk Hills, operations may be tailored to readily adapt to changing electrical energy market conditions by using multiple start ups, shut downs, turn downs and peaking.

Proposed ancillary facilities associated with the EHPP are: a 9.8 mile long cooling water supply pipeline connected to the West Kern Water District system near the intersection of state Highway 119 and Tupman Road; a 2,500 foot natural gas supply pipeline; a 4 mile long wastewater pipeline with deep injection wells; and one of two transmission lines. Transmission line Route 1A would be 9 miles long and would terminate at a new substation located on the west side of the California Aqueduct near the community of Tupman. The substation would connect with the existing 230 kV Midway-Wheeler Ridge transmission line. Route 1B would parallel the existing 115 kV Midway-Taft transmission line and would interconnect at the Midway Substation at Buttonwillow. A variation to Route 1B would combine the EHPP transmission line with the existing Taft-Midway transmission line.

Elk Hills Power, LLC plans to complete construction and start operation of the EHPP by the summer of 2001. During construction, an average of approximately 240 to 350 workers would be employed. During operation, the EHPP would employ 20 full-time staff.

## **STAFF'S ASSESSMENT**

Each technical area section of the FSA contains a discussion of impacts, mitigations measures and conditions of certification. The FSA includes staff's assessments of:

- the environmental setting of the proposal;
- impacts on public health and safety, and measures proposed to mitigate these impacts;
- environmental impacts, and measures proposed to mitigate these impacts;
- the engineering design of the proposed facility, and engineering measures proposed to ensure the project can be constructed and operated safely and reliably;
- project closure;

- project alternatives;
- compliance of the project with all applicable laws, ordinances, regulations and standards (LORS) during construction and operation; and
- proposed conditions of certification, where these can be identified at this time.

## COMPLETE ANALYSES

Staff believes its analysis of the power plant is substantially complete for the following 17 technical areas<sup>1</sup>:

Public Health	Socioeconomics
Hazardous Materials Handling	Waste Management
Worker Safety & Fire Protection	Geology & Paleontology
Transmission Line Safety & Nuisance	Facility Design
Land Use	Reliability
Traffic and Transportation	Efficiency
Noise	Transmission System Engineering
Visual Resources	General Conditions/Compliance
Cultural Resources <sup>2</sup>	

## INCOMPLETE ANALYSES

Four analyses, Air Quality, Biological Resources, Soils and Water Resources, and Alternatives are incomplete.

### ***AIR QUALITY***

The San Joaquin Valley Unified Air Pollution Control District (District) issued the Preliminary Final Determination of Compliance (PDOC) on December 14, 1999. The District is expected to issue the Final Determination of Compliance (FDOC) by February 15, 2000. Staff will need the Final Determination of Compliance (FDOC), and sufficient time, to complete its air quality section of the Final Staff Assessment (FSA). Therefore, staff expects to issue its Air Quality FSA section on March 15, 2000.

### ***BIOLOGICAL RESOURCES***

Staff expects to issue its Biological Resources analysis contained in this FSA on February 18, 2000. Staff is awaiting the applicant's filing of the draft Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP), which is expected on January 7, 2000.

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<sup>1</sup> Need Conformance as a separate "technical area" is no longer required. Staff counsel has prepared a statement, contained in this FSA, regarding Need Conformance.

<sup>2</sup> Due to information from a Native American contact received late in the FSA-writing process, staff has scheduled a Cultural Resources workshop on January 12, 2000, in order to gain clarifying information. If information is received that warrants further analysis, staff will inform the Committee assigned to the EHPP siting case as soon as possible, and will proceed accordingly.

The U.S. Fish and Wildlife Service's (USFWS) Biological Opinion, initiated on December 10, 1999, by the Bureau of Land Management (BLM) as a Section 7 consultation, is expected to be issued after the FSA. (The letter from BLM that initiated consultation with USFWS was received and docketed at the Energy Commission on December 21, 1999.) Staff cautions that unforeseen issues may arise that could delay the Biological Opinion.

### ***SOILS AND WATER RESOURCES***

Staff expects to: 1) hold a workshop on its Soils and Water Resources PSA section in either January or February 2000; and 2) issue its FSA section on February 18, 2000.

### ***ALTERNATIVES***

Staff will need to review the FSA sections in all technical areas before completing the alternatives section of the FSA. Consequently, this section will not be filed until the Air Quality section is filed on March 15, 2000.

### **STAFF RECOMMENDATION**

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Staff has identified four technical areas that are incomplete: Air Quality, Biological Resources, Soils and Water Resources and Alternatives. Staff expects these analyses to be issued as noted above. Although our analysis is potentially complete in 17 areas, resolution of the remaining issues in the other areas will be crucial to the Energy Commission's Decision on this project.

At this time, staff is unable to recommend that the project be certified.

# **Table of Contents**

## **Elk Hill Power Project Final Staff Assessment**

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>INTRODUCTION .....</b>	<b>7</b>
<b>PROJECT DESCRIPTION .....</b>	<b>11</b>
<b>NEED CONFORMANCE .....</b>	<b>17</b>
<b>PUBLIC HEALTH .....</b>	<b>19</b>
<b>WORKER SAFETY AND FIRE PROTECTION .....</b>	<b>31</b>
<b>TRANSMISSION LINE SAFETY AND NUISANCE .....</b>	<b>45</b>
<b>HAZARDOUS MATERIALS MANAGEMENT .....</b>	<b>59</b>
<b>WASTE MANAGEMENT .....</b>	<b>77</b>
<b>LAND USE .....</b>	<b>87</b>
<b>TRAFFIC AND TRANSPORTATION .....</b>	<b>107</b>
<b>NOISE .....</b>	<b>137</b>
<b>VISUAL RESOURCES .....</b>	<b>157</b>
<b>CULTURAL RESOURCES .....</b>	<b>211</b>
<b>SOCIOECONOMICS .....</b>	<b>263</b>
<b>GEOLOGY AND PALEONTOLOGY .....</b>	<b>277</b>
<b>FACILITY DESIGN .....</b>	<b>289</b>
<b>POWER PLANT RELIABILITY .....</b>	<b>317</b>
<b>POWER PLANT EFFICIENCY .....</b>	<b>325</b>
<b>TRANSMISSION SYSTEM ENGINEERING .....</b>	<b>333</b>
<b>GENERAL CONDITIONS INCLUDING COMPLIANCE MONITORING AND CLOSURE PLAN .....</b>	<b>349</b>
<b>GLOSSARY OF TERMS AND ACRONYMS .....</b>	<b>365</b>
<b>PREPARATION TEAM .....</b>	<b>375</b>





# INTRODUCTION

Testimony of Marc S. Pryor

## PURPOSE OF THIS REPORT

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The Final Staff Assessment (FSA) presents the California Energy Commission (Energy Commission) staff's independent analysis of the Elk Hills Power, LLC's Application for Certification (AFC). The FSA is a staff document. It is neither a Committee document, nor a draft decision or proposed decision. The FSA describes the following:

- the existing environment;
- the proposed project;
- whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations and standards (LORS);
- the environmental consequences of the project including potential public health and safety impacts;
- mitigation measures proposed by the applicant, staff, interested agencies and intervenors which may lessen or eliminate potential impacts;
- the proposed conditions under which the project should be constructed and operated, if it is certified;
- project alternatives; and
- project closure

The analyses contained in this FSA are based upon information from: 1) the AFC; 2) subsequent amendments; 3) responses to data requests; 4) supplementary information from local and state agencies and interested individuals; 5) existing documents and publications; 6) independent field studies and research; and 7) comments on the Preliminary Staff Assessment (PSA). The analyses for most technical areas include discussions of proposed conditions of certification. Each proposed condition of certification is followed by a proposed means of "verification". The verification is not part of the proposed condition, but is the Energy Commission Compliance Unit's method of ensuring post-certification compliance with adopted requirements. The FSA presents conclusions and proposed conditions that apply to the design, construction, operation and closure of the proposed facility.

The Energy Commission staff's analyses were prepared in accordance with Public Resources Code section 25500 et seq. and Title 20, California Code of Regulation section 1701 et seq., and the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 15000 et seq.).

## ORGANIZATION OF THE STAFF ASSESSMENT

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This **INTRODUCTION** section of this FSA explains the purpose of the FSA and its relationship to the Energy Commission's siting process. The **PROJECT DESCRIPTION** section provides a brief overview of the project including its purpose, location and major project components.

The need conformance, environmental and engineering evaluations of the proposed project follow the **PROJECT DESCRIPTION**. In the environmental analysis, the project's environmental setting is described, environmental impacts are identified and their significance assessed, and the project's compliance with applicable laws is reviewed. The mitigation measures proposed by the applicant are reviewed for adequacy and conformance with applicable laws; if any remaining unmitigated impacts are identified, staff proposes additional mitigation measures and project alternatives. Staff's conclusions and recommendations are discussed, and proposed conditions of certification are included, if applicable. In the engineering analyses, the project is evaluated in each technical area with respect to applicable laws and performance objectives. Staff proposed modifications to the facility, if applicable, are listed. Each technical section ends with a discussion of conclusions and recommendations. Proposed conditions of certification are included, if applicable.

## ENERGY COMMISSION SITING PROCESS

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The California Energy Commission has the exclusive authority to certify the construction and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (Pub. Resources Code, section 25500). The Energy Commission must review power plant AFCs to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts (Pub. Resources Code, section 25519), conformance with the most recent integrated assessment of need for new resources (Pub. Resources Code, section 25523(f)), and compliance with applicable governmental laws or standards (Pub. Resources Code, section 25523 (d)).

The Energy Commission's siting regulations require staff to independently review the AFC and assess whether the list of environmental impacts contained is complete, and whether additional or more effective mitigation measures are necessary, feasible and available (Cal. Code Regs., tit. 20, sections 1742 and 1742.5(a)). Staff's independent review shall be presented in a report (Cal. Code Regs., tit. 20 , section 1742.5).

In addition, staff must assess the completeness and adequacy of the health and safety standards, and the reliability of power plant operations (Cal. Code Regs., tit. 20, section 1743(b)). Staff is required to develop a compliance plan (coordinated

with other agencies) to ensure that applicable laws, ordinances, regulations and standards are met (Cal. Code Regs., tit. 20, section 1744(b)).

Staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act. No Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the Resources Agency (Pub. Resources Code, section 21080.5 and Cal. Code Regs., tit. 14, section 15251 (k)).

The staff prepares both a preliminary and final staff assessment. The Preliminary Staff Assessment (PSA) presents for the applicant, intervenors, agencies, other interested parties and members of the public, the staff's preliminary analysis, conclusions, and recommendations. Where staff believes it is appropriate, the Final Staff Assessment (FSA) incorporates comments received from agencies, the public and parties to the siting case, comments made at the workshops, and comments received on the PSA. The FSA serves as staff's testimony on a proposal.

Staff uses the PSA to resolve issues between the parties and to narrow the scope of adjudicated issues in the evidentiary hearings. During the period between publishing the PSA and FSA, staff conducts workshops to discuss their findings, proposed mitigation, and proposed compliance monitoring requirements. Based on the workshops and written comments, staff will refine their analysis, correct errors, and finalize conditions of certification to reflect areas where we have reached agreement with the parties.

The staff's assessment is only one piece of evidence that will be considered by the Committee (two commissioners who have been assigned to this project) in reaching a decision on whether or not to recommend that the full Energy Commission approve the proposed project. At the public hearings, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Members' Proposed Decision (PMPD). Following publication, the PMPD is circulated for a minimum of 30 days in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. A revised PMPD is required to undergo a 15-day comment period. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision. Within 30 days of the Energy Commission decision, any party may appeal the decision to the Energy Commission.

A **Compliance Monitoring Plan and General Conditions** will be assembled from conditions contained in the FSA and other evidence presented at the hearings. The Compliance Monitoring Plan and General Conditions will be presented in the PMPD. The Energy Commission staff's implementation of the plan ensures that a certified facility is constructed, operated, and closed in compliance with the conditions adopted by the Energy Commission. The proposed **Compliance Monitoring Plan and General Conditions** are included at the end of the FSA.

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# PROJECT DESCRIPTION

Testimony of Marc S. Pryor

## NATURE AND PURPOSE OF THE PROJECT

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The Elk Hills Power, Limited Liability Company (referred to as either “Elk Hills” or the “applicant”) proposes to construct and operate the Elk Hills Power Project (EHPP), a 500 megawatt (MW) natural gas-fired combined cycle facility located in the Elk Hills region of western Kern County. The applicant’s objective is to “utilize locally-produced natural gas from the Elk Hills Oil and Gas Field for the production of economical, reliable, and environmentally sound electrical energy, capacity, and ancillary services for California’s restructured energy market.”

## PROJECT LOCATION

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The site is about 25 miles west of Bakersfield, California, 9 miles south of the unincorporated community of Buttonwillow, California, and 9 miles north of Taft, California. The 12-acre site is a part of the 47,000 acre Elk Hills Oil and Gas Field operated by Occidental of Elk Hills Inc. (OEHI), formerly the Elk Hills Naval Petroleum Reserve Number 1. The site is currently occupied by out-of-service tanks and related equipment formerly used for the storage and loading of propane, butane, and natural gas liquid products. The oil field is bisected by the public Elk Hills Road that runs north-south between Buttonwillow, an unincorporated community about nine miles north of the plant site, and the City of Taft. However, all access to the oil field is under highly controlled conditions (guards in both guard stations and in mobile security units). Taft has approximately 6,000 people, while McKittrick, Fellows, and Derby Acres are much smaller.

## PROJECT DESCRIPTION

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### POWER PLANT

**PROJECT DESCRIPTION Figure 1** shows the vicinity of the proposed power plant and the proposed linear (related) facilities routes (transmission line; natural gas, raw water supply and wastewater pipelines). The power plant would be located on a 12-acre parcel of previously disturbed land and is within an existing oil and gas production field. The vicinity is heavily developed and utilized by OEHI for natural gas and oil production. Numerous petroleum recovery and storage facilities, electric and petroleum transmission lines, and access roads characterize the area.

**PROJECT DESCRIPTION Figure 2** shows a plan view of the proposed 500-megawatt power plant’s site arrangement. Major features of the power plant are: two power trains, each comprised of one 153 to 166 MW Combustion Turbine Generator (CTG), one Heat Recovery Steam Generator (HRSG); one shared

**PROJECT DESCRIPTION Figure 1**  
**Location of the Proposed Site and Related Facilities**

**PROJECT DESCRIPTION Figure 2**  
**Power Plant Site Arrangement**

171 MW Steam Turbine Generator (STG); and one six-cell cooling tower. Dry low NO<sub>x</sub> combustors will be used in each CTG. Each HRSG will be equipped with a Selective Catalytic Reduction (SCR) emission control system that uses anhydrous ammonia in conjunction with a fixed bed catalyst to reduce NO<sub>x</sub> in the CTG exhaust gases.

Natural gas will be the only fuel used at the facility and will be supplied by OEHI. The EHPP will receive its natural gas supply via a 0.5-mile long, 10-inch diameter gas pipeline from OEHI's existing main natural gas pipeline. The project includes a new 230 kV switchyard and a new 8.6- to 9.0-mile, 230 kV transmission line connecting with Pacific Gas and Electric Company's transmission system (see the transmission line description below). Water for the project will be supplied by West Kern Water District (WKWD) via a new 9.8-mile, 16-inch supply pipeline extending from an existing WKWD facility east of the power plant site. Wastewater will be disposed of in new disposal injection wells located about four miles south of the power plant site. The EHPP is not a cogeneration project because steam from the HRSGs will be used for the generation of power by the STG, not for oil field production.

## **TRANSMISSION LINE OPTIONS**

Power will be generated by the two CTGs and the STG at 13.8 kilovolt (kV) and then is stepped-up to 230 kV for delivery to the power plant's interconnection to PG&E. Two 230 kV transmission line alternatives, Routes 1A and 1B, are being considered to interconnect the EHPP to the California electric transmission grid. In addition, the applicant has proposed a variation of Route 1B. The applicant desires certification of all three transmission line options for flexibility reasons.

### **ALTERNATIVE ROUTE 1A**

Route 1A is a transmission line mounted on steel poles that originates at the power plant site and trends north for about two miles. For most of this distance the transmission line route would parallel the existing 115 kV Midway-Taft transmission line that runs north-south between the Midway Substation and the city of Taft, which is about ten miles south of the plant site. The Midway-Taft transmission line is mounted on steel latticework towers in the Elk Hills area and on concrete poles north of the California Aqueduct. This transmission line is associated to some degree with all three of Elk Hills Power's proposed transmission line route alternatives/variation.

At the two-mile distance, Route 1A turns east and extends about seven miles to a proposed new substation near the unincorporated community of Tupman. The substation would be located near and to the west of the California Aqueduct, and would connect with the existing Midway-Wheeler Ridge transmission line. Because the Midway-Wheeler Ridge transmission line is east of the aqueduct, the connection with the proposed substation would have to cross the aqueduct twice. These crossings would require agreement between PG&E and the California Department of Water Resources.



#### **ALTERNATIVE ROUTE 1B**

The first two miles of Route 1B are the same as 1A and is also a transmission line mounted on steel pole. From this point the route proceeds almost directly to the Midway Substation, crossing the California Aqueduct at about milepost 4.3, and following the east side of Wasco Way. Route 1B would parallel the aforementioned Midway-Taft transmission line which, along Wasco Way, is mounted on concrete poles that are located west of the roadway. Wasco Way is in a cotton-growing agricultural area. The transmission line would interconnect with PG&E's system at the Midway substation, which is about 8.6 miles north of the preferred power plant site.

#### **ALTERNATIVE ROUTE 1B VARIATION**

The Route 1B variation would combine the Midway-Taft transmission line with the proposed Route 1B, thus eliminating the existing lattice tower and concrete poles of the Midway-Taft transmission line with steel poles. The routing would follow the existing Midway-Taft transmission line's route which, along Wasco Way, is located on the west side of the roadway. This route would also interconnect at the Midway substation.

### **CONSTRUCTION AND OPERATION**

The applicant plans to begin construction immediately after certification, which is expected to occur no earlier than June 2000, and commercial operation by the summer of 2001. There will be a peak work force of approximately 240 to 350 individuals and about 20 permanent facility operations personnel.

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# NEED CONFORMANCE

Statement of Kerry Willis, Staff Counsel

The Elk Hills Power Application for Certification was accepted on June 9, 1999. Currently, the Public Resources Code prohibits the Energy Commission from certifying a powerplant unless the Commission makes a finding that the facility is "needed" in accordance with the Commission's integrated assessment of the need for new resource additions. (See, Pub. Resources Code §§ 25523(f) and 25524(a).) The Public Resources Code directs the Commission to do an "integrated assessment of need," taking into account 5- and 12-year forecasts of electricity supply and demand, as well as various competing interests, and to adopt the assessment in a biennial electricity report.

On September 28, 1999, the Governor signed Senate Bill No. 110, which became Chapter 581, Statutes of 1999. This legislation repeals Public Resources Code sections 25523(f) and 25524(a) and amends other provisions relating to the assessment of need for new resources. It thereby removes the requirement that, to certify a proposed facility, the Commission must make a specific finding that the proposed facility is in conformance with the adopted integrated assessment of need. Regarding need-determination, Senate Bill 110 states:

"Before the California electricity industry was restructured the regulated cost recovery framework for powerplants justified requiring the commission to determine the need for new generation, and site only powerplants for which need was established. Now that powerplant owners are at risk to recover their investments, it is no longer appropriate to make this determination."

(Pub. Resources Code, § 25009, added by Stats. 1999, ch. 581, § 1.) Senate Bill 110 takes effect on January 1, 2000 (Cal. Const. Art. 4, § 8.). As of that date, the Commission will no longer be required to determine if a proposed project conforms with an integrated assessment of need. As a result, any application for certification for which the Commission adopts a final decision after January 1, 2000, is not subject to a finding of "need-conformance."

In this case, the Commission's final decision will be made after January 1, 2000. Therefore, because of SB 110, the Commission will make no finding of "need-conformance" with respect to the proposed project.



# PUBLIC HEALTH

Testimony of Obed Odoemelum and Rick Tyler

## INTRODUCTION

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Operating the proposed Elk Hills Power Project (EHPP) would create combustion products and possibly expose workers and the general public to these pollutants as well as the toxic chemicals associated with other aspects of facility operations. The issue of possible worker exposure is addressed in the **Worker Safety and Fire Protection** section of this Final Staff Assessment (FSA). Exposure to electric and magnetic fields (EMF) is addressed in the **Transmission Line Safety and Nuisance** section. The purpose of this public health analysis is to determine whether a significant health risk would result from human exposure to a) the operations-related chemicals, b) combustion by-products emitted during routine operations, and c) toxic pollutants that may be encountered as soil contaminants at the project site.

The exposure evaluated in this analysis is to pollutants for which no air quality standards have been established. These are known as the noncriteria pollutants, or toxic air pollutants. Those for which ambient air quality standards have been established are known as criteria pollutants. These criteria pollutants are identified in this section (along with regulations for their control) because of their contribution to the total pollutant exposure in any given area. Furthermore, the same control technologies may be effective for controlling both types of pollutants when emitted from the same source. Compliance with the required control technologies is discussed in the **Air Quality** section.

## LAWS ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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### FEDERAL

The Clean Air Act of 1970 (42 U.S.C., section 7401 et seq.) required establishment of ambient air quality standards to protect the public from the effects of air pollutants. These standards have been established by the United States Environmental Protection Agency (EPA) for the major air pollutants: nitrogen dioxide, ozone, sulfur dioxide, carbon monoxide, sulfates, particulate matter with a diameter of 10 micron or less (PM10) and lead. The Act required states to adopt plans to ensure compliance by 1982.

### STATE

California Health and Safety Code section 39606 requires the California Air Resources Board (CARB) to establish California's ambient air quality standards to reflect the California-specific conditions that influence its air quality. Such standards have been established by the CARB for ozone, carbon monoxide, sulfur dioxide, PM10, lead, hydrogen sulfide, vinyl chloride and nitrogen dioxide. The same biological mechanisms underlie some of the health effects of most of these criteria

pollutants as well as the noncriteria pollutants. The California standards are listed together with the corresponding federal standards in the **Air Quality** section.

California Health and Safety Code section 41700 states that “No person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause or have a natural tendency to cause injury or damage business or property.”

The California Health and Safety Code section 39650 et seq. mandates that the California Environmental Protection Agency (Cal-EPA) establish safe exposure limits for toxic, noncriteria air pollutants and identify the best available methods for their control. These laws also require that the new source review rules for each air district include regulations establishing procedures to control the emission of these pollutants. The toxic emissions from natural gas combustion are listed in CARB’s April 11, 1996 California Toxic Emissions Factors (CATEF) database for natural gas-fired combustion turbines. Cal-EPA has developed specific cancer potency estimates for assessing their related cancer risks at specific exposure levels. For noncancer-causing toxic air pollutants, Cal-EPA established specific no-effects levels (known as reference exposure levels) for assessing the likelihood of producing health effects at specific exposure levels. Such health effects would be considered likely only when exposure exceeds these reference levels. Staff uses these Cal-EPA potency estimates and reference exposure values in its health risk assessments.

California Health and Safety Code section 44300 et seq. requires facilities, which emit large quantities of criteria pollutants and any amount of noncriteria pollutants to provide the local air district an inventory of toxic emissions. Such facilities may also be required to prepare a quantitative health risk assessment to address the potential health risks involved. The CARB and the San Joaquin Valley Air Quality Management District (SJVUAPCD) will ensure implementation of these requirements for the proposed project.

## **LOCAL**

The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) has no specific rules implementing Health and Safety Code section 44300. It does, however, require the results of a health risk assessment as part of the application for the Authority to Construct (ATC). The EHPP has complied with this requirement.

## **SETTING**

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According to information from the applicant, Elk Hills Power, LLC (EHP), the toxic air contaminants from the project will be emitted into a sparsely populated, mostly agricultural area with oil and gas production fields (EHPPa 1999, pages 5.15-1 through 5.15-5). The area’s population density is 19 persons per square mile according to the 1990 U.S census figures, with the nearest residence to the 12-acre project site located approximately 5.1 miles to the east. There are no sensitive

receptors within a six-mile radius of the site. Sensitive receptors are individuals such as children and the elderly who are usually more susceptible than the general population to the effects of environmental pollutants. Therefore, consideration is given to possible effects on such individuals in establishing exposure limits or assessing the potential for health impacts.

Although children, and the elderly are recognized as sensitive receptors, the specific focus on sensitive receptor impacts with respect to the EHPP and similar projects is intended not necessarily to specify additional mitigation, but to better characterize the odds of symptom occurrence within the population to be subjected to the pollutant impacts at issue (even when actual health symptoms are not expected in individuals with normal sensitivity. Relatively large numbers of sensitive individuals are normally found in schools, hospitals, convalescent homes, and day care facilities, accounting for staff's usual request for their identification on a map of the project area. The concept of sensitive receptor is therefore, not intended to be applied with respect to impacts among normal residences in which sensitive individuals might be present. The suggestion by the California Unions for Reliable Energy (CURE) (CURE 1999c, page 7) that staff revise its analysis to apply the sensitive receptor concept to the normal residents of a home is inappropriate, and reflects a misunderstanding of the sensitive receptor concept as used in health risk assessments.

Staff specifically considers effects within a six-mile radius in evaluating the potential impacts of sources such as the EHPP because staff does not expect impacts to be significant in areas beyond this limit. We note as will be discussed later, that staff found the impacts at the location of maximum exposure (which is near the project site) to be insignificant as reflected by the hazard index values and the numerical value of the incremental cancer risk. Therefore, staff does not expect impacts to be significant beyond this location, and does not consider it necessary to revise our analysis to specifically address impacts at a specific school beyond the six-mile radius, as suggested by CURE (CURE 1999c, page 7).

## **METHOD OF ANALYSIS**

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Any impacts from this type of project would be mainly associated with the toxic pollutants originating from the combustion turbines, ammonia from the selective catalytic reduction (SCR) system, and toxic chemicals from the cooling towers. Potential public exposure to the surrounding population is estimated through air dispersion modeling. In cases of significant soil contamination, potential exposure is calculated for applicable pathways using the measured concentrations of the pollutants of concern. After estimating exposures, staff assesses whether they are at levels below the applicable reference levels, or below the levels of cancer-specific significance. The procedure for evaluating the potential for these cancer and noncancer health effects is known as a health risk assessment process which consists of the following steps:

- a hazard identification step in which each pollutant of concern is identified along with its health effects;
- a dose-response assessment step in which the relationship between exposure and the probability of effects is established;
- an exposure assessment step in which the possible extent of exposure is by dispersion modeling for all possible pathways; and
- a risk characterization step in which the nature and magnitude of the possible human health risk is assessed.

## **HEALTH EFFECTS ASSESSED**

Health risks associated with a project can result from high-level exposure, which creates immediate-onset (acute) effects, or from prolonged (chronic) low-level exposure, which creates chronic effects. Since noncancer effects are assumed to result after exposures above specific thresholds, an analysis of the potential for health impacts will include consideration of background levels. Unfortunately, such background measurements are not usually measurable for the noncriteria pollutants associated with natural gas combustion unless there are major sources in the area. Such pollutants are generally emitted at relatively low levels as compared to the criteria pollutants.

For facilities such as the EHPP, high-level exposure to toxic pollutants (which could cause acute effects) could occur only during major accidents and are not expected from routine operations when emissions are much lower. Therefore, chronic effects are of greater concern than short-term effects in assessing the impacts of routine operations. Chronic effects from exposure to toxic emissions from natural gas combustion may manifest as cancer or health effects other than cancer. Since the EHPP will be located within oil production fields (away from areas of human habitation), the only exposure of potential significance is to workers at the project site, or in the Elk Hills Oil and Gas Fields. Therefore, the potential for effects would be most appropriately evaluated using applicable worker exposure standards, not the reference exposure levels, which are intended for impacts within the general public. For all such sources, the risk of health impacts is assessed using the maximum exposure level possible. Therefore, staff considers results obtained using public exposure-related reference levels (especially when the location of maximum impact is far from areas of human habitation) to be higher than the public health risk possible. Since all such projects are assessed the same way, such results are most accurate for assessing the potential contribution of each project to the pollution load in the area.

## ***METHOD FOR ASSESSING THE LIKELIHOOD OF NONCANCER EFFECTS***

The method used by regulatory agencies to numerically assess the likelihood of significant noncancer health effects is known as the hazard index method and is used to assess the likelihood of both acute and chronic effects. In this method, a hazard index is calculated for the individual pollutants by dividing exposure estimates by the reference level for that pollutant when public exposure is being considered. When exposure is to workers, a much higher reference level (the



worker exposure standard) is used. A hazard index of less than 1.0 suggests that acute or chronic effects would be unlikely. A value of 1.0 or more would suggest a likelihood of effects. The indices for all pollutants are then added together to obtain an aggregate hazard index value for the project in question. A total index of less than 1.0 would suggest a potential lack of effects from the interaction of the pollutants considered. A value of 1.0 or more suggests a potential for significant effects but is not regarded as proof that such effects will occur. In such a case, staff does not recommended specific regulatory actions without a more refined analysis. The likelihood of a significant cancer is assessed using a different method

### ***METHOD FOR ASSESSING THE POTENTIAL FOR A SIGNIFICANT CANCER RISK***

Cancer from carcinogenic exposure usually results from biological effects at the molecular level. Since such effects are currently assumed possible from every exposure to a carcinogen, the risk of cancer is generally considered by staff and other regulatory agencies as more sensitive than the risk of noncancer health effects, for assessing the potential for a significant health hazard. Such sensitivity accounts for the high level of significance currently accorded the numerical estimates of cancer risks in the environmental risk assessment process. For any source of concern, the potential risk of cancer is obtained by multiplying the exposure estimate by the potency values for the individual carcinogens emitted. The potency value is established from animal and human studies to reflect the cancer-causing efficiency of each carcinogen as compared to the others. The total cancer risk is obtained for the project by adding together the risk values obtained for the individual carcinogens. In this process, the exposure that would cause this cancer is conservatively assumed to occur at the same level for a 70-year lifetime to minimize the possibility of underestimating the risk. In practice, however, only the highest possible risk is obtained with this method. The actual cancer risk would likely be much lower, and could indeed be zero. It is, therefore important to interpret the results of such assessments with caution.

### **STAFF'S SIGNIFICANCE CRITERIA**

Energy Commission staff considers a potential cancer risk of one in a million as the threshold of significance for sources of environmental carcinogens. Above this threshold, further mitigation could be recommended after proper consideration of issues related to the conservatism in the assessment process. For noncarcinogenic pollutants, staff will consider significant health impacts unlikely when the hazard index estimate is less than 1.0. If 1.0 or more, staff would regard the related emissions as significant and may recommend mitigation after a more refined analysis.

## **IMPACTS**

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### **PROJECT SPECIFIC IMPACTS**

The pollutant impacts of a given project are assessed separately as construction-related and operational-phase impacts because of differences in their sources of origin.

## **CONSTRUCTION PHASE IMPACTS**

The construction-related risk of concern with respect to the proposed EHPP are related to exposure to toxic emissions from construction equipment and vehicles, and contaminants arising from the disturbed soil. The potential for significance is discussed separately for each type of risk

### **POTENTIAL FOR A SIGNIFICANT HEALTH RISK FROM EXPOSURE TO CONSTRUCTION-RELATED EMISSIONS.**

Potential impacts of criteria pollutants from heavy equipment operation, and particulate matter from site preparation are assessed in staff's **Air Quality** section with respect to the applicable air quality standards and recommendations for minimizing the emission of both criteria and noncriteria pollutants. That section also addresses compliance with applicable emission-limiting Air District rules together with related conditions of certification.

The pollutant emissions of concern with respect to these construction activities are listed in the **Air Quality** section along with their respective emission rates. PM10 was identified as one such pollutant whose control method is also effective for the noncriteria pollutants addressed in this analysis. At the time of our preliminary analysis, the Air Quality staff was in the process of identifying the most effective method to be specified for controlling such construction-related PM10. They have since identified soot filters as adequately effective in this regard and recommend its use with respect to projects such as the EHPP. At the time of the analysis, we considered the Air Quality staff's approach to be potentially adequate for minimizing such emissions and concluded that significant impacts would be unlikely given a) the short-term nature of the construction activities, b) the estimated levels of emissions, and c) the health effects of these pollutants. Staff still considers this approach to be adequate and finds it unnecessary to revise our analysis to identify an appropriate mitigation as suggested by CURE (CURE 1999c, page 7). Moreover, emission of such pollutants (in the relatively remote area of the proposed project where only worker exposure would be potentially significant), would be found insignificant when worker exposure standards are used to assess the potential for significant impacts. Chronic health impacts are usually not expected for emissions from short-term construction activities.

### **POTENTIAL FOR A SIGNIFICANT HEALTH RISK FROM EXPOSURE TO SOIL CONTAMINANTS**

Although there may be locations of soil contamination at the project site, the results of the Phase I Site Assessment survey (EHPP 1999a, Appendix H) suggest that the constituents of such contamination would be unlikely to be found at levels of health significance. As a result, a Phase II Assessment survey was found to be unnecessary. Contaminants at such levels would be unlikely to pose a significant health risk if the soil is handled according to the safety-related requirements specified in the **Air Quality, Waste Management and Worker Safety and Fire Protection** sections. Because of these requirements staff does not consider it necessary, as suggested by CURE (CURE 1999c, page 11), to further analyze such impacts by requiring a Phase II Site Assessment. Such an assessment would be unlikely to yield any useful information.

## ***DIRECT OPERATIONAL IMPACTS***

The applicant conducted a health risk assessment for the project-related emissions of potential significance according to procedures specified in the 1993 California Air Pollution Control Officer's Association (CAPCOA) guidelines for sources of this type. Results of this assessment have been provided to staff, along with documentation of the assumptions used (EHPP 1999a, pages 5.15-3 through 5.15-10). Such documentation was provided with regard to the following:

- pollutants considered;
- emission levels assumed for the pollutants involved;
- dispersion modeling used to estimate potential exposure levels;
- exposure pathways considered;
- the cancer risk estimation process;
- hazard index calculation; and
- characterization of project-related risk estimates.

We have found these assumptions to be generally accurate and agree with the applicant's findings with regard to the numerical public health risk estimates expressed either in terms of a hazard index or the incremental cancer risk. To assess the potential for public health effects, only the project-related emissions were considered in calculating the hazard index values involved since staff does not expect background levels to be significant for the project area. The focus of the analysis was on the potential for health symptoms produced through effects on body systems such as the liver, central nervous system, the immune system, kidneys, the reproductive system, the skin and the respiratory system.

The following pollutants were considered for potential to produce noncancer effects: ammonia, acetaldehyde, acrolein, benzene, 1,3 butadiene; formaldehyde, naphthalene, toluene, xylenes, propylene oxide and polycyclic aromatic hydrocarbons (PAHs). The following were considered with regard to a possible cancer risk: acetaldehyde, benzene, 1,3 butadiene; formaldehyde, PAHs and propylene oxide.

A hazard index value of 0.014 was calculated for combined chronic health effects for the maximally exposed individual who will have to be located relatively near the project site (at a point approximately 1.1 kilometers to the northeast). A value of 0.043 was calculated for combined acute health effects for such an individual who in this case will have to be located at a point approximately 0.25 km to the west. These values are significantly below the 1.0 significance level established with respect to public exposure, suggesting that significant noncancer health effects would be unlikely during operations. Since the project site is inaccessible to the general public, and only workers would be found at the site assessed, only worker exposure standards would be appropriate for impact assessment. Using the much lower public-specific reference to assess such impacts at such points would overestimate the actual public health risk, reflecting the conservatism inherent in

this assessment approach. We note in this regard, that the nearest residence is 5.1 miles from the project site. If such worker exposure standards were used, the potential for acute effects would be found to be much lower than estimated, further reflecting the conservatism in the approach used.

The highest combined cancer risk was estimated to be 0.12 in a million for an individual at the same location identified for the total hazard index for chronic effects. We note that CURE does not disagree with this finding. This risk was calculated using existing procedures in which it is conservatively assumed that the individual will be exposed at the highest possible levels to all the carcinogenic pollutants from the project for a 70-year lifetime. This risk value is much below the one in a million level considered significant by staff regarding public exposure to environmental carcinogens. Since the risk is calculated for a relatively remote location within an oil field, it (as with chronic noncancer effects) reflects a significant overestimation of the actual risk possible within the general public.

CURE disagrees with staff's findings of insignificant noncancer impacts and refers staff to their comments on the same issues in connection with the SCPP (CURE 1999c, pages 7 through 11). They listed the following factors as mostly responsible for the flaws in staff's assessment approach: 1) failure to consider emissions from all significant sources, 2) failure to consider exposure to all chemicals of concern, 3) using an inappropriate emission factor for acrolein, 4) using the wrong risk factors to assess the potential impacts of acrolein exposure, 5) failure to consider background pollutant levels, and 6) failure to adequately consider potential impacts from worst-case emission situations as encountered during start-ups. Staff will address the flaws in each of CURE's assertions separately.

#### **FAILURE TO CONSIDER EXPOSURE TO ALL CHEMICALS OF CONCERN AS WELL AS EMISSIONS FROM ALL SIGNIFICANT SOURCES**

As noted in this analysis, staff considers the following to be of potential health significance with respect to projects such as the EHPP: toxic pollutants from the turbines, ammonia from the selective catalytic reduction system (SCR), operations-related chemicals, and toxic emissions from the cooling tower. We established from our analysis that these pollutants are unlikely to be emitted at levels of health significance with respect to workers on site, or within the oil fields or the general public. We considered the other minor pollutant sources (as found in power plants in general) and determined that their potential contribution to total project emissions would be insignificant in this case. CURE is, therefore, incorrect in asserting that significant pollutant sources were not considered in our analysis.

According to information from the applicant (EHPP 1999a, pages 3-35 and 3-36), potable or treated water (whose quality is reflected in the water quality data provided by the applicant) will be used as make-up water for the project's cooling tower (EHPP 1999a, page 3-36). Staff believes that water of such quality would be unlikely to pose a health hazard from its use in the cooling tower. CURE provided no analysis to support its assertion that sulfates or any other components of cooling tower emissions would pose a health hazard at their levels in this case (CURE 1999c, page 8). The chemicals of usual concern to staff with respect to cooling

towers are the chemicals that pose an established risk of significant health impacts under such use conditions. No such chemicals are proposed for use in the EHPP. We, therefore, consider this aspect of CURE's assertion as reflecting a failure to distinguish between the issues of general applicability to all power plants from issues of specific applicability to this project.

#### **USE OF AN INAPPROPRIATE EMISSION FACTOR IN MODELING EXPOSURE TO ACROLEIN**

In CURE's opinion, staff underestimated the potential for the acute effects of acrolein by first using an inappropriate (lower) emission factor in modeling potential exposure levels, and then using an inappropriate reference value to assess the potential impacts of such exposure as discussed below. They referenced their comments on this issue with respect to the SCPP (letter from K. Poole to M. Pryor, September 2, 1999) for more details. CURE is incorrect in their assertion. We note from their SCPP-related comments that they consider it appropriate to arbitrarily multiply the CARB-derived emission factor for acrolein by ten to correct for perceived flaws in CARB's derivation process. We considered this approach to be inappropriate for SCPP and also for Elk Hills since it could lead to an overestimation of potential the health risks.

#### **USE OF INAPPROPRIATE RISK FACTORS IN ASSESSING THE POTENTIAL IMPACTS OF EXPOSURE TO ACROLEIN AND FORMALDEHYDE**

In their analysis for the project, the applicant used the acrolein and formaldehyde reference exposure levels that were applicable when they filed the Application for Certification (AFC). As noted by CURE, these exposure limits have since been lowered by Cal-EPA. CURE asks that staff use these revised values in our assessment. They believe that the use of these new values would change our findings with respect to acrolein- and formaldehyde-related risks to the potentially exposed public. We disagree, and note that adjusting the acrolein's incremental acute hazard value of 0.002 by the 13-fold decrease in acceptable exposure level would change the value to 0.026 which is still significantly less than the significance value of 1.0. In the case of formaldehyde, such an adjustment would change the incremental acute health index from 0.00006 to 0.00024, which is still significantly below the levels of significance. When the much higher acceptable worker exposure limit is used, the finding of a potential lack of significant impacts would be more pronounced.

#### **FAILURE TO CONSIDER BACKGROUND CONCENTRATIONS IN ASSESSING POLLUTANT IMPACTS**

While staff agrees with CURE that it is appropriate to add background concentrations in assessing the potential for noncancer health impacts, we disagree with CURE's assertion that we failed to consider such background concentrations in our analysis. They believe that this omission is responsible for staff's finding of insignificance with respect to the project's emissions and referenced their more detailed comments and data on this issue with respect to the SCPP (CURE 1999c). As with the SCPP, staff does not expect these noncriteria pollutants to be encountered in the project area at significant concentrations. We note that, of the 62 pollutants that CURE measured for in the Midway-Sunset oil field area (in connection with the SCPP), only 11 were detectable, and only at parts per billion levels. The only detected pollutant that would be emitted from projects, such as the

EHPP or similar projects, is acrolein. Staff considers potential impacts from acrolein insignificant in spite of CURE's findings to the contrary. In staff's opinion, CURE's findings of significance (with respect to potential acrolein impacts) are due to significant flaws in their assessment approach (CURE 1999c). CURE's general failure to detect these pollutants at significant levels is as staff expects because in the project area there are no sources that staff considers significant. CURE is incorrect in assuming that staff failed to consider background pollutants in our analysis.

#### IMPACTS FROM PROJECT START-UPS

According to information from the applicant (EHPP 1999a, page 5.2-31), turbine start-ups are expected to last approximately 120 minutes and may occur 120 times a year per turbine. These warm start-ups are distinct from the cold start-ups that occur only once or twice a year. CURE's concern about such start-ups (CURE 1999c, page 9) stems from the fact that acrolein and formaldehyde (volatile organic compounds, or VOCs) would be emitted at higher levels in this 120-minute period than during normal operations. While we agree with CURE that such emissions could occur at higher levels than under normal conditions, we note that the project's turbines will be equipped to achieve the Air District's Best Available Control Technology (BACT)-driven VOC limit of 5 ppm for a 24-hour period (EHPP 1999a, page 5.2-28). Given a) the low hazard levels we calculated for the project's acrolein and formaldehyde, b) the significant distance to inhabited areas, c) the health basis for acrolein and formaldehyde reference levels, and d) the relatively short duration of such start-ups, staff does not consider these start-up emissions as posing a significant public health hazard.

## PROJECT CLOSURE

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During temporary or permanent closure, no emissions would be released from the project's turbines. The greatest concern would be from the accidental release of either hazardous materials or wastes, which may be stored on site. These concerns are addressed respectively in the **Hazardous Materials** and **Waste Management** sections. When the project is closed permanently after the 30 years of expected operations, it would be dismantled, creating the potential for fugitive dust emission or toxic emissions from the dismantling-related equipment. Such emissions would be controlled by implementing the related conditions specified by the Air Quality staff after receiving a closure plan.

## CUMULATIVE IMPACTS

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In addition to the EHPP, the Commission is reviewing the SCPP; and has certified the La Paloma Generating Project (LPGP), all of which are in the same western Kern County area. The three projects, all of which will burn natural gas, intend to use the same state-of-the art pollution controls as currently available. They are to be located between 6.7 and 8 miles from one another. Staff has reviewed the potential public health impacts from each project to determine the potential cumulative impacts that could result from their combined operation.

When toxic pollutants are emitted from multiple sources within a given area, the cumulative, or additive, impacts of such emissions could, in concept, lead to significant health impacts within the population, even when such pollutants are emitted at insignificant levels from the individual sources involved. Analyses of such emissions have shown, however, that the peak impacts of such toxic pollutants are normally localized within relatively short distances from the source. Toxic pollutant emission levels beyond the point of maximum impact normally fall within existing ambient background levels. Potentially significant cumulative impacts are only expected in situations where new sources are located adjacent to one another. The highest impact levels from each of the three projects being evaluated are approximately one mile or less from the emissions source. Therefore, given the distance from 6.7 and 8-mile between each of the projects, their combined operation will not contribute significantly to any public health impacts from toxic pollutant emissions.

CURE asserts that our findings inadequately reflect the potential contribution of all area subjects to cumulative pollutant exposures (CURE 1999c, page 10). We disagree. As noted above, and reflected in the results of staff's analysis, the maximum impacts of emissions from specific sources usually occur relatively close to the project. For example, such locations of maximum impacts for the EHPP are between 0.25 kilometers and 1.1 kilometers from the project and are at levels staff considers insignificant. Unless future projects are located immediately adjacent to the EHPP and other projects, the impact overlap of potential significance with respect to cumulative exposure would not be expected. Staff does not expect such patterns of project siting in the area.

## CONCLUSIONS AND RECOMMENDATIONS

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### CONCLUSIONS

Staff has determined that the construction and operation of the proposed natural gas-burning project will not pose a significant health risk to on-site workers, oil field workers, and the surrounding population with regard to the pollutants considered. CURE's concern about the project's impacts are mostly related to specific flaws in their assessment approach.

### RECOMMENDATIONS

Since no significant human health impacts are considered likely with implementation of specific recommendations in the **Air Quality, Waste Management and Worker Health Fire Protection** sections, no Public Health Conditions of Certification are proposed.

## REFERENCES

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CAPCOA (California Air Pollution Control Officers Association) 1993. Air Toxics "Hot Spots" Program, Revised 1992 Risk Assessment Guidelines. Prepared by the Toxics Committee, October 1993.

CARB (California Air Resources Board) 1996. California Toxic Emissions Factors (CATEF) Database for Natural Gas-Fired Combustion Turbine Cogeneration.

CURE (California Unions for Reliable Energy) 1999c. CURE's comments on staff's Preliminary Staff Assessment, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, December 8, 1999

EHPP (Elk Hills Power Project) 1999a. Application for Certification (99-AFC-1). Submitted to the California Energy Commission, February 24, 1999

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# WORKER SAFETY AND FIRE PROTECTION

Testimony of Chris Tooker and Rick Tyler

## INTRODUCTION

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Industrial workers use process equipment and hazardous materials on a daily basis. Accidents involving relatively small amounts of material can result in serious injuries to workers. Worker protection measures can include special training, protective equipment and procedural controls. The employer must also comply with applicable laws, ordinances, regulations and standards (LORS) to protect workers. This **Worker Safety and Fire Protection** analysis assesses the completeness and adequacy of the measures proposed for the Elk Hills Power Project (EHPP) by the applicant, Elk Hills Power, LLC (EHP) to comply with applicable health and safety standards and other reasonable requirements (Title 20, California Code Regulations, section 1743); and draws conclusions about the compliance of the proposed project with applicable LORS (Title 20, California Code Regulations, section 1744). These standards are designed to protect the health and safety of workers during construction and operation of the facility, and to establish adequate fire protection and emergency response procedures.

Comments on this section in the Preliminary Staff Assessment made by the California Unions for Reliable Energy (CURE) regarding toxic pollutants that may be encountered as soil contaminants at the project site have been addressed within the **Public Health** section of this Final Staff Assessment (FSA).

Staff has reviewed the EHPP Application for Certification (AFC) to determine whether EHP has proposed adequate measures to:

- comply with all applicable (LORS);
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

Unless features of the project present unusual industrial safety or fire protection problems, staff believes that compliance with applicable LORS will be sufficient to ensure worker safety and fire protection, and provide adequate emergency response procedures.

## **LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)**

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### **FEDERAL**

- Occupational Safety and Health Act of 1970 (29 United States Code sections 651 et seq.).
- Occupational Safety and Health Administration Safety and Health regulations (29 Code of Federal Regulations §§ 1910.1 - 1910.1500).
- Occupational Safety and Health Act of 1970 (29 United States Code section (USC) (§) 651 et seq.).
- 29 C.F.R. 1910.120 (HAZWOPER Standard): Defines the regulations for Hazardous Waste Operations and Emergency Response. This section covers the clean-up operations, hazardous materials removal work, corrective actions, voluntary clean-up operations, monitoring, and emergency response required by federal, state, and local agencies of hazardous substances that are present at controlled and uncontrolled hazardous waste sites.
- 29 C.F.R. §§1910.1 - 1910.1500 (Occupational Safety and Health Administration Safety and Health regulations).
- 29 C.F.R. §§1952.170 - 1952.175 (Approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in §§ 1910.1 - 1910.1500).

### **STATE**

California's plan for enforcement of its own Safety and Health requirements is in lieu of most of the federal requirements found in 29 CFR §§ 1952.170 - 1952.175.

- Title 8, California Code of Regulations (CCR), section 450 et seq. (Applicable requirements of the Division of Industrial Safety, including Unfired Pressure Vessel Safety Orders, Construction Safety Orders, Electrical Safety Orders, and General Industry Safety Orders).
- California Building Code, Title 24, CCR, § 501 et seq. The California Building Code is designed to provide minimum standards to safeguard human life, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, etc. of buildings and structures.
- Title 8, CCR, § 5192 (HAZWOPER Standard). Defines the regulations for Hazardous Waste Operations and Emergency Response. This section covers the clean-up operations, hazardous removal work, corrective actions, voluntary clean-up operations, monitoring, and emergency response required by federal, state, local agencies of

hazardous substances that are present at controlled and uncontrolled hazardous waste sites.

## LOCAL

- 1998 Edition of California Fire Code (CFC) and all applicable National Fire Protection Association (NFPA) standards. The fire code contains provisions necessary for fire prevention and information about fire safety, special occupancy uses, special processes, and explosive, flammable, combustible and hazardous materials.
- Uniform Fire Code Standards. This is a companion publication to the CFC and contains standards of the American Society for Testing and Materials and of the National Fire Protection Association.
- California Building Code. (Cal. Code Regs., Tit. 24, § 501 et seq.) The California Building Code is designed to provide minimum standards to safeguard human life, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, etc. of buildings and structures.

## SETTING

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The EHPP is located about 25 miles west of Bakersfield, California, in western Kern County. The site is approximately 12 acres and is in the center of the 74 square mile Elk Hills Oil and Gas Field. Off-site fire protection is provided by the Kern County Fire Department (KCFD). WORKER SAFETY AND FIRE PROTECTION Table 1 lists the fire stations located closest to the EHPP site and their response time capabilities, equipment and staffing levels (Dickson 1999).

**WORKER SAFETY AND FIRE PROTECTION Table 1**  
**Fire Station/Fire Protection Capabilities**

Station	Response Time	Equipment	No. of Firefighters
Station 23 - Fellows 100 Broadway	10 minutes	1997 Pierce Saber Engine	2
Station 24 - McKittrick 2nd Street	12 minutes	1997 Pierce Saber Engine	2
Station 21 - Taft 303 10th Street	25 minutes	1990 Beck Engine	3
Station 22 - Maricopa 801 Stanislaus (HAZMAT TEAM)	23 minutes	1997 Pierce Saber Engine	2
Landco Station 3000 Landco Drive Bakersfield (HAZMAT TEAM)	45-50 minutes	Engine Hazmat Response Vehicle Technical Rescue Vehicle	3

## IMPACTS

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### DIRECT IMPACTS

#### ***FIRE PROTECTION***

To determine the project's impacts on fire protection, staff reviewed the information provided in the AFC regarding available fire protection services and equipment, which are intended to limit personnel injury and property loss (EHPP 1999a, Section 3.4.10). The project will include the following fire protection equipment: fire hydrants and sprinkler systems, a carbon dioxide fire protection system, deluge spray system for the anhydrous ammonia storage tank, fire detection sensors, and portable fire extinguishers. Three hundred and seventy thousand gallons of water from the on-site 1,000,000 gallon raw water storage tank is dedicated to the fire protection system. EHP will be required to provide final diagrams and plans to staff and the KCFD, prior to construction and operation of the project, to confirm the adequacy of these fire protection measures. The EHPP will also be supported by local fire protection services, as described in WORKER SAFETY AND FIRE PROTECTION Table 1. The KCFD has evaluated the potential impacts of the proposed project on their service capabilities, as described below under CUMULATIVE IMPACTS.

#### ***WORKER SAFETY***

Industrial environments are dangerous. Workers may be exposed to chemical spills, hazardous wastes, fires, moving equipment, and confined space and entry/egress problems. It is important for EHP to have well-defined policies, procedures, training, hazard recognition and control at their facility to minimize such hazards and to protect workers. EHP has provided adequate outlines of their proposed worker safety plans that will be expanded prior to construction and operation of the project, as required by conditions of certification **SAFETY-1** and **SAFETY-2**.

### CUMULATIVE IMPACTS

There could potentially be five power plants built in western Kern County in the near future, including the La Paloma, Sunrise, Elk Hills, Midway-Sunset, and Pastoria projects. Staff has completed a visual inspection of the proposed project sites and the KCFD responding fire stations. Staff has confirmed that some of the structures proposed to be located on the proposed project sites can average more than 50 feet taller than the largest buildings in the communities of Buttonwillow, Elk Hills, and Taft. The KCFD has adequate resources to respond to emergencies that consist of structures that are approximately one story high only. Because of the height of some of the power plant equipment and structures, the KCFD has identified a need for additional resources, such as a ladder truck for elevated hose streams, and high-angle and confined space rescue capabilities, to adequately serve the proposed projects.

Staff held a meeting with the KCFD on March 3, 1999 to discuss potential impacts of the proposed projects on the KCFD's service capabilities. Staff subsequently received a letter from the KCFD, dated March 18, 1999, which identifies the potential service impacts of the proposed projects. The letter also identifies additional equipment and staffing required for the KCFD to provide fire protection and emergency response services to the power plant projects.

The letter states:

"Both of the County's two ladder trucks are located in the metropolitan Bakersfield area; the ladder truck closest to the power plants is located about 40 miles away. The operations and structures associated with the thermal electric power plants result in increased incident complexity and access problems which our typical fire engine is not equipped to handle (both in terms of number of personnel and specialized equipment) without the back up of a ladder truck. The distance between the power plant locations and the metropolitan Bakersfield area is such that it is not acceptable to dispatch an existing ladder truck for emergency response to Western Kern County because of excessive time delay. The potential needs for elevated hose streams, and high-angle and confined space rescue capability can only be addressed through the addition of a ladder truck; it will provide the appropriate fire apparatus to get the specialized personnel and equipment to the scene of incidents in a timely manner and provide the elevated platform for hose streams and rescue access as needed." (Dickson 1999)

## MITIGATION

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As mitigation for the impacts to fire protection services, the KCFD is proposing that the applicant or applicants purchase a ladder truck that will be located at Station 21 in Taft. One ladder truck will be required as mitigation for all of the proposed projects. High Angle and Confined Space Specialist Technicians would be trained to operate the ladder truck, and staffing for three work shifts would need to be provided, including a captain, an engineer and a firefighter. Refer to the Socioeconomics section of this Preliminary Staff Assessment (PSA) for a discussion of funding requirements recommended by staff to address the proposed project's direct and cumulative impacts on the KCFD's fire protection service capabilities.

California Unions for Reliable Energy (CURE) has suggested that to reduce the response time of the ladder truck from 25 minutes to 10-12 minutes in response to a fire at the EHPP that the ladder truck be located at Station 23 in Fellows or at Station 24 in McKittrick, rather than at Station 21 in Taft (CURE, 1999). Staff has discussed this suggestion with the KCFD. According to Captain Phil Castle, response time is an important factor in the location of critical fire protection equipment such as the ladder truck. However, there are two other important and over-riding reasons for housing

the ladder truck in Taft: First, of the three stations mentioned, only Station 21 in Taft has adequate facilities to house the ladder truck. Second, only the Taft station has sufficient staff to operate the ladder truck. Captain Castle believes that the response time from Taft for the ladder truck is acceptable, especially since it would not normally be the first responding unit, but would be directed by units already at the fire when it arrives, after they have had an opportunity to evaluate the fire (Castle, 1999).

## **CONSTRUCTION SAFETY AND HEALTH PROGRAM**

The Construction Safety Orders found in Title 8, California Code of Regulations contain health and safety requirements promulgated by California Occupational Safety and Health Administration (Cal-OSHA) that are applicable to the construction phase of the project (CCR, tit. 8, § 1500 et seq.). The various plans required by the regulations are incorporated in the project Construction Safety and Health Program, the major elements of which include:

- Construction Injury and Illness Prevention Program (IIPP) (CCR, tit. 8, § 1509);
- Construction Fire Protection and Prevention Plan (CCR, tit. 8, § 1920);
- Personal Protective Equipment Program (CCR, tit. 8, §§ 1514 - 1522; and §§ 3401 - 3411).

In addition, the requirements of the Electrical Safety Orders (CCR, tit. 8, and §§-2299 - 2974) and Unfired Pressure Vessel Safety Orders (CCR, tit. 8, §§ 450 - 544) may be applicable to the project.

EHP provided adequate outlines in the AFC for each of the above programs and plans (EHPP 1999a, Section 5.14) and prior to construction of the facility will provide detailed programs and plans in accordance with condition of certification **SAFETY-1**.

## **OPERATION SAFETY AND HEALTH PROGRAM**

During the operation phase of the project, many Electrical Safety Orders (CCR, tit. 8, and §§-2299 - 2974) and Unfired Pressure Vessel Safety Orders (CCR, tit. 8, §§ 450 - 544) will be applicable. In addition, the Division of Industrial Safety has promulgated regulations applicable solely to operations. These are contained in the General Industry Safety Orders (CCR, tit. 8, § 3200 et seq.). EHP will incorporate these requirements into its Operation Safety and Health Program, the major elements of which include:

- Injury and Illness Prevention Program (CCR, tit. 8, § 3203).
- Emergency Action Plan (CCR, tit. 8, § 3220).
- Fire Prevention Plan (CCR, tit. 8, § 3221).
- Personal Protective Equipment Program (CCR, tit. 8, §§ 3401 - 3411).

EHP provided adequate outlines for each of the programs and plans in the AFC and will provide detailed programs and plans in accordance with condition of certification **SAFETY-2**.

## **SAFETY AND HEALTH PROGRAM ELEMENTS**

EHP has provided proposed outlines for both a Construction Safety and Health Program and an Operation Safety and Health Program (EHPP 1999a, Section 5.14.1.2). Both programs will cover the EHPP, including any aspect of the transmission lines and pipelines under the applicant's control. The measures in these plans are derived from applicable sections of state and federal law. The major items required in both Safety and Health Programs are as follows:

### ***INJURY AND ILLNESS PREVENTION PROGRAM***

EHP has provided an adequate draft outline for an Injury and Illness Prevention Program (IIPP). EHP will need to submit an expanded Injury and Illness Prevention Program to Cal-OSHA for review and comment 30 days prior to both construction and operation of the project.

Cal-OSHA will review and provide comments on the IIPP as the result of an on-site consultation at the request of EHP, during which a Cal-OSHA representative will complete a physical survey of the site, analyze the work practices, and point out those practices that are likely to result in illness or injury. The on-site consultation will give Cal-OSHA an opportunity to evaluate EHP's IIPP and apply it directly to activities taking place on-site.

### ***EMERGENCY ACTION PLAN***

Title 8, California Code of Regulations, section 3220 requires an Emergency Action Plan. The AFC contains a satisfactory outline for an emergency action plan, including fire and emergency reporting procedures, evacuation procedures, and a Spill Prevention/Control and Countermeasure Plan. Staff proposes condition of certification **SAFETY-2**, which requires EHP to submit a final Operation's Emergency Action Plan to Cal-OSHA, for review and comment, after an on-site consultation.

### ***FIRE PROTECTION PLAN***

Title 8, California Code of Regulations, section 3221 requires a Fire Protection Plan. The AFC contains an outline of a fire protection and prevention plan that is adequate for staff's analysis. The outline includes the appropriate components, including, training, fire control and emergency response, alarm systems, fire fighting equipment, and materials storage and disposal procedures.

Staff proposes that EHP submit a Construction Fire Protection and Prevention Plan and an Operation Fire Protection Plan to the California Energy Commission Compliance Project Manager (CPM) and the KCFD for

review and approval to satisfy proposed conditions of certification **SAFETY-1** and **SAFETY-2**.

### ***PERSONAL PROTECTIVE EQUIPMENT PROGRAM***

The purpose of the Personal Protective Equipment Program is to ensure that employers comply with applicable requirements for the provision and use of Personal Protective Equipment (PPE), and to provide employees with the information and training necessary to carry out the program. EHP has provided a satisfactory outline that identifies minimum requirements of a proposed PPE program.

Under Title 8, California Code Regulations, sections 3380 - 3400, personal protective equipment will be required whenever hazards are encountered which, due to process, environment, chemicals, or mechanical irritants, can cause injury or impairment of body function as a result of absorption, inhalation, or physical contact. The project's operational environment will create potential situations where personal protective equipment is required.

EHP' PPE Program should include a written policy on the use of protective equipment (and methods of communicating the information to the employees), selection of the proper type of equipment, training of employees on the correct use and maintenance of the equipment, enforcement of personal protective equipment use, and the use of devices that provide respiratory protection, hearing conservation, eye protection and head protection.

Staff believes that if EHP develops and carries out a PPE Program similar to the format and elements listed above, the program will meet applicable regulations and will significantly reduce the potential for adverse impacts to workers.

### ***GENERAL SAFETY***

Besides the specific plans listed above, there are other requirements, some of which are called "safe work practices," imposed by various worker safety LORS applicable to this project. For the sake of clarity, staff has grouped these requirements as follows:

#### **LIGHTING**

American National Standards Practice for Industrial Lighting, ANSI/IES-RP-7, contains requirements to protect workers from inadequate lighting. Insufficient light leads to errors and sometimes accidents. An error may result from not seeing a situation that is dangerous and not being able to react quickly enough. The Visual Resources section of this PSA provides further detail concerning off-site consequences and performance requirements for exterior lighting.



#### HAZARDOUS MATERIALS RELEASES

Staff's analysis considered the system design and administrative procedures proposed to reduce the likelihood of an accidental release of acutely hazardous materials that could affect workers. See the **Hazardous Materials** section of this PSA for more detail.

#### SMOKING

EHP shall not allow smoking in areas designated in the National Electrical Code (NEC) as Class I, Divisions 1 and 2. These locations are areas where ignitable concentrations of flammable gases or vapors exist or where volatile flammable liquids or flammable gases are handled, processed, or used. Signs restricting smoking in these areas of the project site will be posted to protect the facility and workers.

#### LOCK-OUT/TAG-OUT

Title 8, California Code of Regulations, sections 2320.4, 2320.5, 2320.6, 2530.43, 2530.86, 3314, and 6003 identify required lock-out and tag-out safety practices and programs which reduce employee exposure to moving equipment, electrical shock, and hazardous and toxic materials. Lock-out is the placement of a padlock, blank flange, or similar device on equipment to ensure that it will not be operated until the lock-out device is removed. Tag-out is the use of warning signs that caution personnel that equipment cannot be energized until the lock-out device is removed. Warning signs can also be used to alert employees about the presence of hazardous and toxic materials. EHP's lock-out/tag-out program should include steps for applying locks and tags, steps for removing locks and tags, and employee training on lock-out/tag-out procedures.

#### CONFINED SPACES ENTRY PROGRAM

Title 8, California Code of Regulations, sections 5156 - 5159 identifies the minimal standards for preventing employee exposure to dangerous air contaminants and/or oxygen deficiency in confined spaces. A confined space is any space that limits the means of egress, is subject to toxic or flammable contaminants, or has an oxygen-deficient atmosphere. Examples of confined spaces are silos, tanks, vats, vessels, boilers, compartments, ducts, sewers, pipelines, vaults, bins and pits. EHP shall take the following steps to ensure worker safety during work in confined spaces.

Before entering a confined space, site personnel will evacuate or purge the space and will shut off lines that provide access for substances into the space. The air in the vessels will be tested for oxygen deficiency, and the presence of both toxic and explosive gases and vapors will be evaluated before entry into the confined space is allowed. Lifelines or safety harnesses will be worn by anyone entering the confined space, and a person will be stationed outside in a position to handle the line and to summon assistance in case of emergency. Appropriate respirators will be available whenever hazardous conditions may occur.

## HOT WORK

Hot work is any type of work that causes a spark and can ignite a fuel source. Examples include welding, cutting and brazing. Before proceeding with hot work, workers will need to get a work authorization from the project's assigned Safety Officer. The control operator, together with the shift supervisor, will decide whether hot work is required on a job and if a work authorization will be required. Before hot work is undertaken, the area will be inspected, the job shall be posted and, depending on what is located in the area, additional safeguards may be implemented.

## FACILITY CLOSURE

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The project owner/operator is responsible for maintaining an operational fire protection system during closure activities. The project must also stay in compliance with all applicable health and safety LORS during that time.

## CONCLUSION AND RECOMMENDATIONS

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### CONCLUSIONS

If EHP provides a Construction Safety and Health Plan, and an Operation Safety and Health Plan, as required by conditions of certification **SAFETY-1** and **SAFETY-2**; and provides the funding required by Conditions of Certification **SOCIO-2**, staff believes that the project will incorporate sufficient measures to ensure adequate levels of industrial safety and fire protection, and comply with applicable LORS.

### RECOMMENDATIONS

If the Energy Commission certifies the project, staff recommends that the Energy Commission adopt the following proposed conditions of certification. The proposed conditions of certification provide assurance that the Project Construction and Operation Safety and Health Programs proposed by EHP will be reviewed by the appropriate agencies before implementation. The conditions also require verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable LORS.

## PROPOSED CONDITIONS OF CERTIFICATION

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**SAFETY-1** The project owner shall submit to the CPM a Project Construction Safety and Health Program, which shall include:

- A Construction Injury and Illness Prevention Program.
- A Construction Fire Protection and Prevention Plan.
- A Personal Protective Equipment Program.

**Protocol:** The Construction Injury and Illness Prevention Program and the Personal Protective Equipment Program shall be submitted to the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal-OSHA) Consultation Service, for review and comment concerning compliance of the program with all applicable Safety Orders.

The Construction Fire Protection and Prevention Plan shall be submitted to the KCFD for review and acceptance.

**Verification:** Thirty days prior to the start of construction, or a lesser period of time as mutually agreed to by the project owner and the CPM, the project owner shall submit to the CPM a copy of the Project Construction Safety and Health Program and the Personal Protective Equipment Program, with a copy of the cover letter of transmittal of the plan to CAL-OSHA. The project owner shall provide a letter from the KCFD stating that they have reviewed and accept the Construction Fire Protection and Prevention Plan.

**SAFETY-2** The project owner shall submit to the CPM a Project Operation Safety and Health Program containing the following:

- An Operation Injury and Illness Prevention Plan.
- An Emergency Action Plan.
- An Operation Fire Protection Plan.
- A Personal Protective Equipment Program.

**Protocol:** The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to the Cal-OSHA Consultation Service, for review and comment concerning compliance of the program with all applicable Safety Orders.

**Protocol:** The Operation Fire Protection Plan and the Emergency Action Plan shall be submitted to the KCFD for review and acceptance.

**Verification:** At least 30 days prior to the start of operation, the project owner shall submit to the CPM a copy of the final version of the Project Operation Safety & Health Program. It shall incorporate Cal-OSHA's Consultation Service comments, stating that they have reviewed and accepted the specified elements of the proposed Operation Safety and Health Plan.

The project owner shall notify the CPM that the Project Operation Safety and Health Program (Injury and Illness Prevention Plan, Fire Protection Plan, the

Emergency Action Plan, and Personal Protective Equipment requirements), including all records and files on accidents and incidents, is present on-site and available for inspection.

**SAFETY-3** The project owner shall design and install all exterior lighting to meet the requirements contained in the Visual Resources conditions of certification and in accordance with the American National Standards Practice for Industrial Lighting, ANSI/IES-RP-7.

**Verification:** Within 60 days after construction is completed, the project owner shall submit a statement to the CPM that the illuminance levels contained in ANSI/IES RP-7 were used as a basis for the design and installation of the exterior lighting.

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# TRANSMISSION LINE SAFETY AND NUISANCE

Testimony of Obed Odoemelum

## INTRODUCTION

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According to the applicant, Elk Hills Power, LLC (EHP), the energy produced at the proposed Elk Hills Power Project (EHPP) will be transmitted to the existing Pacific Gas and Electric (PG&E) power grid through a new double circuit, 230 kV overhead line. Three routes identified as Route 1A, Route 1B and a variation of Route 1B are proposed for this interconnection. Route 1A will be 9 miles while Route 1B or its variation will be 8.6 miles. (EHPP 1999a, pages 3-53 through 3-59, 1999c, page 36). The line within each route will be located to ensure a distance of at least 50 feet from an oil well (EHPP 1999a, pages, 5.7-16 and 5.7-17). Operating such a line could create several health and safety hazards as described by the applicant (EHPP 1999a, pages, 4-2 through 4-7). Such hazards will be reduced through compliance with laws, ordinances, regulations and standards (LORS) identified by EHP as applicable to the proposed project (EHPP 1999a, page 6-10).

The purpose of this analysis by the Energy Commission staff is to assess the proposed transmission line design, placement and operation for appropriate incorporation of measures necessary for compliance with applicable LORS. If found satisfactory, staff will recommend that the line design be approved for the routes proposed; if not, staff will recommend design or placement-related revisions to further mitigate the health and safety hazards that could result. The assessment will evaluate issues, which relate primarily to the physical presence of the line, or secondarily to the physical interactions of line electric and magnetic fields, as will be discussed later. These issues are:

- Aviation safety;
- Interference with radio-frequency communication;
- Audible noise;
- Fire hazards;
- Hazardous shocks;
- Nuisance shocks; and
- Electric and magnetic field (EMF) exposure.

## **LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)**

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Discussed below by subject area are design-related LORS applicable to the physical impacts of transmission lines as proposed for the power facility.

### **FEDERAL**

#### ***AVIATION SAFETY***

Any hazard to area aircraft relates to the potential for collision with the line in the navigable air space. The applicable LORS are intended to ensure the distance and visibility necessary to avoid such collision.

- Title 14, Part 77 of the Federal Code of Regulations (CFR), “Objects Affecting the Navigation Space”. Provisions of these regulations specify the criteria used by the Federal Aviation Administration (FAA) for determining whether a “Notice of Proposed Construction or Alteration” is required for potential obstruction hazards. The need for such a notice depends on factors related to the height of the structure, the slope of an imaginary surface from the end of nearby runways to the top of the structure, and the length of the runway involved. Such notification allows the FAA to ensure that the structure is located to avoid any significant hazards to area aviation.
- FAA Advisory Circular (AC) No. 70/460-2H, “Proposed Construction and or Alteration of Objects that may Affect the Navigation Space”. This circular informs each proponent of a project that could pose an aviation hazard of the need to file the “Notice of Proposed Construction or Alteration” (Form 7640) with the FAA.
- FAA AC No. 70/460-1G, “Obstruction Marking and Lighting”. This circular describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.

#### ***INTERFERENCE WITH RADIO-FREQUENCY COMMUNICATION***

Transmission line-related radio-frequency interference is one of the indirect effects of line operation as produced by the physical interactions of line electric fields. The level of such interference usually depends on the magnitude of the electric fields involved. Because of this, the potential for such impacts could be assessed from field strength estimates obtained for the line. The following regulations are intended to ensure that such lines are located away from areas of potential interference and that any interference is mitigated whenever it occurs.

- Federal Communications Commission (FCC) regulations in 47 CFR 15.25. Provisions of these regulations prohibit operation of any devices producing force fields, which interfere with radio communications, even if (as with transmission lines) such devices are not intentionally designed to produce



radio-frequency energy. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as corona discharge but is referred to as spark gap electric discharge when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The FCC requires each line operator to mitigate all complaints about interference on a case-specific basis. Staff usually recommends specific conditions of certification to ensure compliance with this FCC requirement. Since electric fields cannot penetrate the soil and other objects, underground lines do not produce the radio noise associated with overhead lines.

Several design and maintenance options are available for minimizing these electric field-related impacts. When incorporated in the line design and operation, such measures also serve to reduce the line-related audible noise discussed below.

## **STATE**

- General Order 52 (GO-52), California Public Utilities Commission (CPUC). Provisions of this order govern the construction and operation of power and communications lines and specifically deal with measures to prevent or mitigate inductive interference. Such interference is produced by the electric field induced by the line in the antenna of a radio signal receiver.
- GO-128 "Rules for Construction of Underground Electric Supply and Communications Systems". Provisions of this order establish requirements and minimum standards for the safe construction of underground AC power and communications circuits.

## **AUDIBLE NOISE**

As with radio noise, any audible noise from a transmission line usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying or hissing sound or hum. Since (as with communications interference), the noise level depends on the strength of the line electric field, the potential for occurrence can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during wet weather and from lines of 345 kV or higher. It, therefore, is generally not expected at significant levels from lines of less than 345 kV. Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a 100-ft right-of-way. There are no design-specific regulations to limit the audible noise from transmission lines. As with radio noise, such noise is limited instead through design and maintenance

standards established from industry research and experience as effective without significant impacts on line safety, efficiency maintainability and reliability.

## ***FIRE HAZARDS***

The fires addressed through the following regulations are those that could be caused by sparks from conductors of overhead lines or that could result from direct contact between the line and nearby trees.

- General Order 95 (GO-95), CPUC, “Rules for Overhead Electric Line Construction”. This order specifies tree-trimming criteria to minimize the potential for power line-related fires.
- Title 14 Section 1250 of the California Code of Regulations, “Fire Prevention Standards for Electric Utilities”. This code specifies utility-related measures for fire prevention.

## ***HAZARDOUS SHOCKS***

The hazardous shocks that are addressed by the following regulations and standards are those that could result from direct or indirect contact between an individual and the energized line. Such shocks are capable of serious physiological harm or death and remain a driving force in the design and operation of transmission and other high-voltage lines.

- GO-95, CPUC. “Rules for Overhead Line Construction”. These rules specify uniform statewide requirements for overhead line construction regarding ground clearance, grounding, maintenance and inspection. Implementing these requirements usually ensures the safety of the general public and utility and non-utility workers. Non-utility workers in this case would include workers engaged in oil field or gas pipeline-related activities.
- Title 8, CCR, Section 2700 et seq., “High Voltage Electric Safety Orders”. These safety orders establish essential requirements and minimum standards for safely installing, operating, and maintaining electrical installations and equipment. Compliance with the distancing and safety requirements in this order will prevent hazardous shocks among utility and non-utility workers working around utility and non-utility installations such as gas water and sewer lines, and oil wells.
- National Electrical Safety Code, (NESC) Part 2: Safety Rules for Overhead Lines. Provisions in this part of the code specify the national safe operating clearances applicable in areas where the line might be accessible to the public. Such requirements are intended to minimize the potential for direct or indirect contact with the energized line.

## ***LOCAL***

There are no local laws or regulations specifically aimed at the physical structure or dimensions of electric power lines to limit their obstruction or hazardous shock hazards, or eliminate the interactive effects of their electric or magnetic fields. All

the noted LORS are implemented industry wide to ensure that lines are uniformly constructed to reflect existing health and safety information while ensuring efficiency and reliability.

## **SETTING**

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As discussed by EHP (EHPP 1999a, page 5.7-11), the proposed transmission line will be located in an area with existing power lines of 115 kV and 230 kV lines. Route 1A will traverse areas of oil and gas production as well as undeveloped and commercial areas. It will also pass near a school, a church and a rural residential area, along the way. Route 1B and its variation will also traverse an oil production area, undeveloped areas, agricultural areas and rural residential areas. The electric and magnetic fields from the line will therefore contribute to any cumulative EMF human exposures in the area. The interactive effects of nearby lines have, therefore, been considered in assessing the potential for electric and magnetic field exposures along each route. Since the line will be connected to the existing PG&E transmission system, it will be designed according to PG&E's field-reducing design guidelines.

Individuals in the project area may be exposed to line-related fields for varying periods of time. The level of each exposure would depend on the distance from the line. Short-term exposure could occur while in transit or during short-term activities around the line. The general magnitude of such short-term exposures is well established, being generally lower than exposures from the use of common household appliances, such as hair dryers, toaster ovens, microwave ovens and electric shavers. Such exposures have not caused any significant health concerns in the past and are not the reason for the present concern about EMF exposure. As will be more fully discussed later, such concern is over the possibility of health effects from long-term, generally lower-level exposure, which is most commonly associated with living in houses near a line. Since such houses are normally located beyond the edge of the right-of-way, the long-term exposure at issue can be assessed from field strength estimates obtained for areas beyond the edge of the right-of-way. The continuing challenge is to meaningfully interpret such exposures in light of present uncertainty about possible health significance at any given level.

## **PROJECT DESCRIPTION**

Project Description Figure 1 shows routes 1A, 1B and the variation on 1B as proposed for possible connect to the existing PG&E grid. As detailed by EHP, (EHPP 1999a, pages 3-53 through 5-64, & EHPP 1999c, page 36), the line in Route 1A will originate from the new project switchyard and extend 0.2 miles northwest to intercept the route of PG&E's existing 115 kV Midway-Taft transmission line. The line will then extend 1.8 miles north-northeast, running parallel to this Midway-Taft line to the extent allowed by the terrain and necessary to avoid area oil wells. The line will further extend eastwards for the PG&E interconnection at a new substation along the route of the Midway-Taft line. This new substation will be within the Elk Hills Oil and Gas Field boundaries. Near the Town of Tupman, along the way, the line route will be over 500 ft to the south of Elk Hills School. The nearest residence will be about 800 ft from the line (EHPP 1999a, page 5.7-13).

The 8.6-mile line within Route 1B will originate from the new project switchyard and also extend 0.2 miles northwest to intercept the route of the existing PG&E 115 kV Midway-Taft line. It will then extend 4.1 miles north-northeast, running parallel to the Midway-Taft line to the extent allowed by the terrain and necessary to avoid area oil wells. The line will further extend 4.3 miles north to the Midway Substation. Along the way, the line will run parallel to the Midway-Taft line. It will also cross the California Aqueduct and pass by eight rural residences and a 10-unit agricultural camp. In the area with nearby residences, an existing PG&E 12-kV line will be relocated underground and the proposed line located within its existing right-of-way. The line will be located 100 ft or more from the nearest residences, on one side of the line. On the other side, such distancing from residences will result from the presence of an existing road and the corridor of an existing PG&E transmission line (EHPP 1999a, page 5.7-14). The main difference between Route 1B and its variation is that this variation will, unlike Route 1B, replace, rather than run parallel to the Midway-Taft line as it extends from the power line to the Midway Substation.

The line within each route will be constructed with tubular steel poles as shown in PROJECT DESCRIPTION Figure 4. These poles will be sized to maintain the conductors at least 30 ft from the ground in keeping with PUC's requirements and will be placed up to 1,225 ft apart. The conductor configuration and current flow pattern (phasing) were chosen to maximize the cancellation effects of fields from the line's conductors. (EHPP 1999a, page 4-7). All three routes were chosen to parallel existing roads and line rights-of-way to the extent possible (EHPP 1999a, pages 5.3-31 and 5.4-21). This is in keeping with present state policy encouraging location of new lines as close as possible to, or within, existing utility rights-of-way.

## **IMPACTS**

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As noted in the LORS section, GO-95, GO-128 and Title 8, CCR provide the minimum regulatory requirements necessary to avoid the direct or indirect contact previously discussed in connection with hazardous shocks and aviation hazards. Of secondary concern in project evaluation are the field-related impacts manifesting as nuisance shocks, electric and magnetic field exposure, and radio noise and communications interference, as also discussed above. These impacts are reduced through specific field-reducing design guidelines developed for each utility service area in the state. As will be more fully discussed later, these guidelines were established to ensure uniformity in EMF reduction approach, in light of present knowledge on field effects and the potential impacts of field control measures on line operations. The extent of such measures, together with the related field strengths, will vary according to environmental and other local conditions bearing on line safety, efficiency, reliability and maintainability. When the ground-level strengths of such fields are calculated, they can be used to assess each line for appropriate implementation of the applicable field-reducing measures. The impacts of most concern in terms of indirect effects are nuisance shocks and electric and magnetic field exposure. These secondary impacts are assessed for every project in addition to the primary issues of aviation safety, and hazardous shocks.

## **NUISANCE SHOCKS**

Nuisance shocks around transmission lines are non-hazardous but unpleasant experiences caused by current flow at levels generally incapable of causing significant physiological harm. Such shocks mostly result from direct contact with metal objects in which electric charges are induced by fields from the energized line. For modern high-voltage lines, shocks of this type are effectively minimized through grounding procedures specified in the National Electrical Safety Code and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). As with lines of the type proposed, EHP will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way. Staff will recommend specific conditions of certification to ensure that such grounding is made within the right-of-way by both EHP and property owners.

## **ELECTRIC AND MAGNETIC FIELD EXPOSURE**

The previously noted possibility of health effects of electric and magnetic fields has increased public fear in recent years about living near high-voltage lines. Both fields occur together whenever electricity flows, hence the general practice of considering both as EMF exposure. The available evidence as evaluated by CPUC and other regulatory agencies has not established that such fields pose a significant health hazard to exposed humans. However, Energy Commission staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff, therefore, considers it appropriate, in light of present uncertainty, to reduce such fields to some degree, where feasible, until the issue is better understood. The challenge has been to establish when, and how far to reduce them.

While there is considerable uncertainty about the EMF/health effects issue, the following facts have been established from the available information and have been used to establish existing policies.

- Any health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns relate to the magnetic field.
- The measures employed for such field reduction can affect line safety, reliability, efficiency and maintainability, depending on the type and extent of such measures.

In light of the present health uncertainty, some regulatory agencies have opted for regulations ensuring that fields from new lines are similar to those from existing lines. Some states (Minnesota, Florida, New York, Montana New Jersey) have set specific environmental limits on one or both fields in this regard. These limits are, however, not based on any specific health effects. All regulatory agencies are of the opinion, as is staff, that health-based limits are inappropriate at this time. The

regulatory agencies also have determined that the present knowledge of the issue does not justify any retrofit of existing lines.

Before the present health-based concern developed, measures to reduce field effects from power line operations were mostly aimed at the electric field component, whose effects can manifest as the previously noted radio noise, audible noise and nuisance shocks. The present focus is on the magnetic field because only it can penetrate building materials to potentially produce the types of health impacts at the root of the present concern. As one focuses on the strong magnetic fields from the more visible transmission and other high-voltage power lines, staff considers it important for perspective, to again consider the previously noted fact that an individual in a home could be exposed for short periods to much stronger fields while using some common household appliances (National Institute of Environmental Health Services and the U.S Department of Energy 1995). Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Energy Commission staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than the power line environment.

In California, the CPUC (which regulates the installation and operation of high-voltage lines in California) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It required the previously noted EMF-reducing design guidelines of all utilities under its jurisdiction. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Utilities not within the jurisdiction of the CPUC voluntarily comply with these CPUC requirements.

In keeping with this CPUC policy, staff requires that each applicant provide evidence verifying that the proposed line will be designed according to the EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local issues bearing on safety, reliability efficiency and maintainability. It, therefore, is up to each applicant to ensure that such measures are applied in ways, and to an extent, without significant impacts on line operation. The extent of such applications will be reflected by the ground-level field strengths as measured during operation. When estimated or measured for the line, such field strengths can be used by staff and other regulatory agencies for comparison with fields of lines of similar voltage and current-carrying capacity. Such field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the structures, degree of cancellation from nearby conductors, distance between conductors and, in the case of magnetic fields, amount of current in the line.

Since the proposed line will be designed according to PG&E's EMF-reducing guidelines, their fields are required, under existing CPUC policies, to be similar to fields from similar lines in the PG&E service area. Conditions of certification **TLSN-3** is proposed by staff to verify implementation of the reduction measures necessary.

## **PROJECT SPECIFIC IMPACTS**

### ***AVIATION SAFETY***

As noted by EHP, (EHPP 1999a, page 4-2) there are no major aviation centers or airports in the vicinity of the proposed power plant. There is a gravel surfaced 3000-ft landing strip approximately 1.5 miles west of transmission line Route 1B or its variation. This landing strip is occasionally used for crop dusting operations. Staff considers the minimum 30-ft height of the transmission line design as adequate for unimpeded crop duster operations. An FAA "Notice of Construction or Alteration" has been submitted to the FAA as a matter of routine practice in siting power lines. From its consideration of all issues related to distance from the line and FAA safety requirements, staff is in agreement with EHP that the proposed line will not pose a significant hazard to area aviation.

### ***INTERFERENCE WITH RADIO-FREQUENCY COMMUNICATION***

Experience has shown that spark gap discharges are mostly responsible for any radio interference around the type of transmission line proposed. Such interference is generally avoided through appropriate maintenance, which minimizes occurrence of the structural gaps involved. The previously noted provisions of the related FCC regulations are important in requiring each project owner to ensure mitigation of any such interference to the satisfaction of the affected individual. Energy Commission staff will recommend that EHP be required to mitigate any such complaints on a case-specific basis. The applicant has further noted that the line's corona-reducing design would be adequate to prevent any radio noise-related complaints. This is as staff expects for a line of the voltage proposed. Staff has proposed a condition of certification (**TLSN-2**) to ensure mitigation of any interference-related complaints on a case-specific basis, as required by the FCC. **TLSN-1** has also been proposed by staff to ensure compliance with GO-52, also intended to prevent radio interference.

### ***AUDIBLE NOISE***

According to information from EHP (EHPP 1999a, pages 4-2 through 4-5), the low-corona design for the line could produce some corona-related noise, especially during foul weather. However, the calculated foul-weather noise level of 46.2 dB directly underneath the line is less than the levels generally associated with complaints, for example, in the service area of the Bonneville Power Authority (BPA). The fair-weather level of less than 24.7 dB would not add significantly to existing noise levels under normal conditions. These noise levels are below the applicable values specified in the Noise Ordinance of Kern County. EHP, therefore, does not expect the noise from the proposed line design to generate any complaints in the area. Staff is in agreement with Elk Hill's conclusions regarding the noise

level expected for the line voltage and the conductor configuration proposed. For an assessment of the noise from all phases of the proposed power plant and related facilities, please refer to staff's analysis in the **Noise** section.

### ***FIRE HAZARDS***

The proposed line will be routed through a primarily agricultural or oil field area where adequate fire prevention and suppression measures will be implemented, as required by related regulations (EHPP 1999a, page 4-7). Compliance with the requirements of GO-90, and Title 14, CCR section 1250 will ensure the clearance necessary to prevent fires possible from direct contact between the transmission line, trees and other objects. Compliance with condition of certification **TLSN-4**, as staff proposes, will prevent accumulation of combustible materials that would contribute to such fires.

### ***HAZARDOUS SHOCKS***

EHP has stated their intention to comply with the requirements of GO-95, and Title 8, CCR Section 2700 et.seq., as intended to prevent hazardous shocks from direct or indirect human contact with the overhead energized line (EHPP 1999a, page 6-10). Staff does not expect such a hazard from the proposed line design and proposes a condition of certification (**TLSN-1**) to ensure implementation of the measures necessary.

### ***NUISANCE SHOCKS AND ELECTRIC AND MAGNETIC FIELDS***

EHP calculated the maximum electric and magnetic field strengths expected from the line design proposed. Staff has verified the accuracy of Elk Hill's calculations with regard to parameters and assumptions bearing on field strengths and dissipation, and exposure assessment. Such calculations can allow staff to assess the potential contribution of the line to area electric and magnetic fields during operations.

A maximum magnetic field strength of 93.7 mG was calculated for the area directly underneath the line, while 26.1 mG was calculated for a distance of 50 ft from the centerline. These values are as expected by staff for lines of the same voltage class and current-carrying capacity. They are also, as noted by EHP, much lower than levels established by states with regulatory limits on such fields.

A maximum electric field strength of 1.3 kV/m was calculated for the area directly under the line. This is similar to fields from lines of similar voltage and design. Experience has shown nuisance shocks to be mostly associated with field strengths significantly greater than 1.6 kV/m in the transmission line environment. For the proposed line design, the 1.3 kV/m field directly underneath, will diminish to around 0.45 kV/m at a distance of 50 feet from the centerline. Nuisance shocks of any significance are not expected, especially in light of the grounding measures to be implemented (EHPP 1999a, pages 4-6 and 4-7). Condition of certification **TLSN-3** is proposed by staff to verify that the fields are reduced to the extent proposed by the applicant while conditions of certification **TLSN-5** and **TLSN-6** are proposed to ensure the preventive measures necessary for nuisance shock mitigation in the case of property owners along the route.



## CONCLUSIONS AND RECOMMENDATIONS

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### CONCLUSIONS

Since electric or magnetic field health effects have neither been established nor ruled out for lines such as proposed for this project, the public health significance of any project-related field exposure cannot be characterized with certainty. The long-term, mostly residential magnetic exposure at the root of the present health concern will likely occur in the area beyond the edge of the right-of-way. Project-related exposures estimates for such areas are significantly below levels associated with similar lines in the PG&E service area. This is due to Elk Hill's proposed application of particularly effective EMF-reducing measures (EHPP 1999a, pages 4-6 and 4-7). These field strengths are significantly lower than levels established by states with specific regulatory limits for such fields. Specific efforts are intended by EHP to maximize the distance to the nearest residences. This should further serve to reduce long-term exposure below levels associated with similar lines.

Any nuisance shocks from such lines will be minimized through grounding and other measures to be implemented by EHP. Compliance with GO-95, GO-128 and Title 8, Section 2700 et seq. of the California Code of Regulations will ensure the safety of humans around the line. Since the line will be located away from all area airports, any hazard to area aviation will be small. The use of an electric field-reducing conductor configuration together will minimize the potential for interference with radio-frequency communication.

### RECOMMENDATIONS

Since the impacts of concern to staff will be mitigated to levels staff considers acceptable for lines of the type proposed, staff recommends approval for the line design as proposed for the two routes identified by EHP as Route 1A and Route 1B/1B Variation. If such approval is granted, staff recommends that the Commission adopt the following conditions of certification to ensure implementation of the measures necessary to achieve the field levels assumed for the proposed line design by the applicant.

### CONDITIONS OF CERTIFICATION

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**TLSEN-1** The project owner shall construct the proposed transmission line according to the requirements of GO-95, GO-52, Title 8, Section 2700 et seq. of the California Code of Regulations and PG&E's EMF reduction guidelines.

**Verification:** Thirty days before start of transmission line construction, or as mutually agreed to by the project owner, and the Energy Commission Compliance Project Manager (CPM), the project owner shall submit to the Commission's CPM a letter signed by a California registered engineer affirming that the transmission line will be constructed according the requirements of GO-95, Title 8, Section 2700 et seq. of the California Code of Regulations and PG&E's EMF reduction guidelines.

**TLSN-2** The project owner shall make every reasonable effort to identify and correct, on a case-specific basis, all complaints of interference with radio or television signals from operation of the line and related facilities. In addition to any transmission repairs, the relevant corrective actions should include, but shall not be limited to, adjusting or modifying receivers, repairing, replacing or adding antennas, signal amplifiers, filters, or lead-in cables.

The project owner shall maintain written records for a period of five years, of all complaints of radio or television interference attributable to operation together with the corrective action taken in response to each complaint. All complaints shall be recorded to include notations on the corrective action taken. Complaints not leading to a specific action, or for which there was no resolution should be noted and explained. The record shall be signed by the project owner and also the complainant, if possible, to indicate concurrence with the corrective action or agreement, with the justification for a lack of action.

**Verification:** All reports of line-related complaints shall be summarized and included in the Annual Compliance Report to the CPM.

**TLSN-3** The project owner shall engage a qualified consultant to measure the strengths of the line electric and magnetic fields before and after the line is energized. Measurements should be made at appropriate points along the route to allow verification of design assumptions relative to field strengths. The areas to be measured should include the facility switchyard and any residences within 100 feet of the right-of-way.

**Verification:** The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after measurements are completed.

**TLSN-4** The project owner shall ensure that combustible materials in close proximity to the energized conductors (e.g. tree branches) are cleared from the right-of-way as required under the provisions of section 4292 of the Public Resources Code and Section 1250 of the California Code of Regulations.

**Verification:** The project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way, in a report to be filed at completion of construction and yearly, thereafter, for five years.

**TLSN-5** The project owner shall send a letter to all owners of property within 100 feet or adjacent to the right-of-way at least 60 days prior to first transmission of electricity.

**Protocol:** The letter shall consist of the following;

A discussion of the nature and operation of a transmission line;

- A discussion of the project owner's responsibility for grounding existing fences, gates and other large permanent chargeable objects identified during transmission line construction within the right-of-way regardless of ownership;
- A discussion of the property owner's responsibility for grounding and to notify the project whenever the property owner adds or installs a metallic object; and
- A statement recommending against fueling motor vehicles or other mechanical equipment underneath the line.

**Verification:** The project owner shall submit the proposed letter to the CPM for review and approval 30 days prior to mailing to the property owners and shall maintain a record of correspondence (notification and response) related to this requirement, in a compliance file at the plant site. The project owner shall notify the CPM in the first Monthly Compliance Report that letters have been mailed and that copies are on file.

**TLSN-6** The project owner shall ensure the grounding of any ungrounded permanent metallic objects identified during transmission line construction within the right-of-way, regardless of ownership. Such objects shall include fences, gates, and other large permanent chargeable objects. These objects shall be grounded according to procedures specified in the National Electrical Safety Code.

In the event of a refusal by the property owner to permit such grounding, the project owner shall so notify the CPM. Such notification shall include, when possible, the owner's written objection. Upon receipt of such notice, the CPM may waive the requirement for grounding the object involved.

**Verification:** At least 10 days before the line is energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

## REFERENCES

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Elk Hills Power Project (EHPP) 1999a. Application for Certification, Elk Hills Cogeneration Power Project. (99-AFC-1). Submitted to the California Energy Commission, February 24, 1999.

EHPP (Elk Hills Power Project) 1999c. Response to California Energy Commission (CEC) staff data requests nos. 1-44, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission August 3, 1999.

Electric Power Research Institute (EPRI) 1982. Transmission Line Reference Book: 345 kV and Above

Energy Commission Staff, 1992. High Voltage Transmission Lines: Summary of Health Effects Studies. California Energy Commission Publication, P700-92-002.

National Institute of Environmental Health Services 1998. An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. A Working Group Report, August, 1998.

# HAZARDOUS MATERIALS MANAGEMENT

Testimony of Joseph M. Loyer and Rick Tyler

## INTRODUCTION

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The purpose of this analysis is to determine if the proposed Elk Hills Power Project (EHPP) will result in potential for significant impact on the public as a result of the use, handling or storage of hazardous materials at the proposed facility. If significant adverse impacts are identified, Energy Commission staff must also evaluate the potential for facility design alternatives or additional mitigation measures to reduce impacts to the extent feasible, as required pursuant to Title 20, California Code of Regulations, section 1748.5.

The only hazardous material proposed for use at the EHPP facility in quantities exceeding the reportable amounts defined in the California Health and Safety Code, Section 25532 (a) (P), is anhydrous ammonia. The use of anhydrous ammonia poses the principal risk of off-site impacts in the event of a major accidental release associated with the project. Anhydrous ammonia is a liquefied gas stored at elevated pressure, which has a high internal energy. The energy associated with the anhydrous form of ammonia can act as a driving force in an accidental release which can rapidly introduce large quantities of the material to the ambient air, where it can be transported in the atmosphere and result in high down-wind concentrations.

Other hazardous materials stored in smaller quantities such as mineral and lubricating oils, corrosion inhibitors, water conditioners, hydrogen and caustics and acids will be present at the proposed facility. However, these materials pose minimal potential for off-site impacts as a result of the quantities on site, their relative toxicity, and/or their environmental mobility. Although no natural gas is stored, the project will also involve the construction and operation of a natural gas pipeline and handling of large amounts of natural gas. Natural gas poses risk of both fire and explosion. The natural gas pipeline is addressed below.

The EHPP will also require the transportation of anhydrous ammonia to the facility. Analysis of the risk associated with such deliveries is addressed in staff's **Traffic and Transportation** analysis.

## LAWS, ORDINANCES, REGULATIONS, STANDARDS AND POLICIES

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The following federal, state, and local laws and policies generally apply to the protection of public health and hazardous materials management. Their provisions have established the basis for staff's determination regarding the significance and acceptability of project-related impacts on public health due to accidental releases of hazardous materials.

## **FEDERAL**

The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III and Clean Air Act of 1990 established a nationwide emergency planning and response program and imposed reporting requirements for businesses which store, handle, or produce significant quantities of extremely hazardous materials. The Acts (codified in 40 C.F.R., section 68.115, part F) require the states to implement a comprehensive system to inform local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of these Acts are reflected in the California Health and Safety Code, section 25531 et seq.

## **STATE**

The California Health and Safety Code, section 25534 directs facility owners, storing or handling acutely hazardous materials in reportable quantities, to develop a Risk Management Plan (RMP) and submit it to appropriate local authorities, the United States Environmental Protection Agency (EPA), and the designated local Administering Agency for review and approval. The plan must include an evaluation of the potential impacts associated with an accidental release, the likelihood of an accidental release occurring, the magnitude of potential human exposure, any preexisting evaluations or studies of the material, the likelihood of the substance being handled in the manner indicated, and the accident history of the material. This new, recently developed program supersedes the California Risk Management and Prevention Plan (RMPP).

Title 8, the California Code of Regulations, section 5189 requires facility owners to develop and implement effective safety management plans to insure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the RMP process.

California Health and Safety Code, section 41700 requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."

## **LOCAL AND REGIONAL**

The Uniform Fire Code (UFC) contains provisions regarding the storage and handling of hazardous materials. These provisions are contained in Articles 79 and 80. The latest revision to Article 80 was in 1999 (UFC 1999). These articles contain minimum setback requirements for outdoor storage of ammonia.

The California Building Code contains requirements regarding the storage and handling of hazardous materials. The Chief Building Official must inspect and verify compliance with these requirements prior to issuance of an occupancy permit. A

further discussion of these requirements is provided in the **Facility Design** portion of this document.

## **SETTING**

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### **SITE AND VICINITY DESCRIPTION**

Several factors associated with the area in which a project is to be located affect its potential to cause public health impacts from an accidental release of a hazardous material. These include:

- the local meteorology,
- terrain characteristics, and
- the location of population centers and sensitive receptors relative to the project.

Staff considered these factors, as discussed below, in assessing the potential public health impacts of the project.

### ***METEOROLOGICAL CONDITIONS***

Meteorological conditions, including wind speed, wind direction and air temperature, affect the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the level of public exposure to such materials and the associated health risks. When wind speeds are low and stable, dispersion is severely reduced and can lead to increased localized public exposure.

Recorded wind speeds and ambient air temperatures are described in the air quality section of the AFC (EHPP1999a, AFC Section 5.2). This data indicates that wind speeds below 1.5 meters per second and temperatures exceeding 100°F are not uncommon for the project area. Therefore, staff suggested that the applicant use F stability (stagnated air, very little mixing), 1.5 meters/second wind speed and an ambient temperature of 100°F in its modeling analysis of an accidental release to reflect worst case atmospheric conditions. These conditions were reflected in the modeling used to estimate the potential worst case impacts associated with an accidental ammonia release. Additional modeling of more likely accident scenarios and more realistic meteorological conditions were also evaluated.

### ***TERRAIN CHARACTERISTICS***

The location of elevated terrain (terrain above the release height) is often an important factor to be considered in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. The principal risk of accidental release at this facility is associated with anhydrous ammonia. Accidental releases of anhydrous ammonia typically result in denser than air plumes that do not rise. Thus, elevated terrain has no important effect on modeled results.

## **LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS**

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses (Calabrese 1978). Also, the location of the population in the area surrounding a project site may have a large bearing on health risk. Figure 5.15-2 (EHPP 1999a) shows the locations of both populated areas and sensitive receptors in the project vicinity. The nearest resident is located 5.1 miles north of the proposed site. The nearest sensitive receptor (a school) is located 6.5 miles east of the proposed site in the town of Tupman. Elk Hills Road is a public road that runs north/south along the proposed power plant site, approximately 140 meters from the facility fence line. On the eastern side of Elk Hills Road (approximately 500 meters from the facility fence line), Occidental of Elk Hills, Inc. (OEHI) has several temporary structures that it intends to continue to operate as field offices for oil field development. There is also an existing cogeneration facility located west of the proposed facility.

The California Unions for Reliable Energy (CURE) has stated in their comments on the preliminary staff assessment (PSA) for the EHPP that potential impacts on off-site workers from an accidental release of anhydrous ammonia are being ignored (CURE 1999c). The off-site workers in question are employed by Occidental Petroleum Corporation (OPC) which is the parent company to the applicant, Elk Hills Power, LLC (EHP). Since these workers are employees of the parent company to the applicant, it is staff's opinion that they do not meet the criteria for being public receptors in the EPA Risk Management Plan Program (RMP). Therefore, they will be addressed in the **Worker Safety** section of the final staff assessment (FSA) for the EHPP.

## **IMPACTS**

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The Energy Commission staff has determined that anhydrous ammonia and natural gas are the only hazardous materials to be handled that pose any potential risk of off-site impacts. The following is a project-specific analysis of the potential impacts associated with the handling of each of these materials:

### **ANHYDROUS AMMONIA**

Anhydrous ammonia will be used in controlling the emission of oxides of nitrogen (NO<sub>x</sub>) from the combustion of natural gas in the facility. The accidental release of anhydrous ammonia can result in hazardous down-wind concentrations of ammonia gas. The anhydrous ammonia storage facility will have a capacity of 12,000 gallons, a spill containment wall, an ammonia vapor detection system, and an automated water deluge system. The anhydrous ammonia will be delivered by 8,000-gallon tank trucks. The unloading area will be paved with concrete and will include berms that will be sufficient to hold the volume of one delivery (EHPP 1999a, page 5.12-4).

To assess the potential impacts associated with an accidental release of ammonia, staff typically evaluates where four "bench mark" exposure levels of ammonia gas



occur off-site. These include: 1) the lowest concentration posing a risk of lethality, 2,000 ppm; 2) the Immediately Dangerous to Life and Health level (IDLH) of 300 ppm; 3) the Emergency Response Planning Guideline 2 (ERPG) level of 200 ppm, which is also the RMP level 1 criterion used by EPA and California; and 4) the level considered by the Energy Commission staff to be without serious adverse effects on the public for one time exposure of 75 ppm. (A detailed discussion of the exposure criteria considered by staff and their applicability to different populations and exposure-specific conditions is provided in Appendix A of this analysis.) If the exposure associated with a potential release would exceed 75 ppm at any public receptor, staff will presume that the potential release poses a risk of significant impact. However, staff may also assess the probability of occurrence of the release and/or the nature of the potentially exposed population. Staff may, based on such analysis, determine that the likelihood and extent of potential exposure are not sufficient to support a finding of potentially significant impact.

In their response to staff data request, EHP provided the modeling results for three accidental release scenarios, a five inch hole in the anhydrous ammonia storage tank, a valve or piping failure and a valve or piping leak (EHPP 1999d). The five-inch hole in the anhydrous ammonia tank represents the worst case release scenario. A valve or piping failure represents a major release characteristic of an accident during the transfer of material from a tank truck to the storage facility. A smaller leak from the same valves or piping represents a minor accidental release characteristic of improper maintenance.

In conducting this analysis it was assumed that winds of 1.5 meters per second and category F stability would exist at the time of the accidental release. For each release scenario, the analysis includes results both with and without the water deluge system being activated. This screening analysis was designed to predict the maximum possible impacts based on distance from the storage tank without regard to specific direction of transport.

The analysis of the worst case release scenario was performed assuming that the water deluge system fails to operate, and assuming pessimistic meteorological conditions that result in exposures exceeding 75 PPM at the nearest residence, 5.1 miles away, and the nearest sensitive receptor, 6.5 miles away. However, the probability of this scenario occurring is very low. No other modeled scenarios resulted in any impact on either the nearest resident or the nearest sensitive receptor. However, all three scenarios resulted in high down-wind concentrations of ammonia at the nearby offices currently being used by OEHI and at Elk Hills Road. Traffic along Elk Hills Road is characterized as 20-40% truck traffic associated with the oil field development, an annual daily average of 900 vehicles and an annual peak hour of 90 vehicles (EHPP 1999a, page 5.11-8). Therefore, staff makes the conservative assumption that an accidental release of ammonia during the peak commute hour may result in very high down wind concentrations for no more than 90 vehicles. Assuming a half-hour exposure level, such an accidental release could expose no more than 35 vehicles.

As a result of concerns regarding exposure levels on Elk Hills Road, EHP provided an analysis of the probability of occurrence associated with the three modeled

release scenarios. EHP estimated the probability of the Worst Case scenario to be  $3.72 \times 10^{-5}$  over the life (30 years) of the power plant. This is equivalent to one accident out of 26,880 similar storage facilities over a 30-year period (EHPP 1999d). The worst case scenario also reflects the concurrent occurrence of F stability and 1.5 meters per second wind speeds and assumes winds directly toward OEHI Offices and Elk Hills Road. From data presented in Air Quality Appendix K of the AFC (EHPP 1999a, page K-2-24) the probability of occurrence of F stability and winds speed less than 2.01 meters per second in any direction is 2.04%. Therefore, the maximum risk of a Worst Case impact is  $7.59 \times 10^{-7}$  over the life of the power plant, or one accident in more than a million similar storage facilities located in a similar wind pattern over a 30 year period. Therefore, staff concludes that the worst case impact is not plausible.

CURE, in their comments on the PSA, stated that the preceding analysis is “mathematically, statistically and technically incorrect” (CURE 1999c). Staff will respond to each assertion as follows. “Mathematically” and “Statistically”: CURE contends that the probability of an accident occurring is independent of the probability of particular meteorological conditions and that staff has incorrectly included such meteorological conditions in the probability of the accident occurring (CURE 1999c). CURE has mischaracterized or misunderstood the analysis provided in the PSA. Staff calculated the probability of the worst case release scenario causing an impact, or “worst case impact” (see above paragraph). The worse case impact is based on the probability of a release occurring and the probability of specific meteorological conditions existing that will cause the worst possible impact. Since these two events are independent, statistically speaking, and the probability of a worst case impact is dependent on both events occurring simultaneously, staff’s method of multiplying their individual probabilities of occurrence together is both mathematically and statistically correct.

“Technically”: CURE makes the assertion that a risk assessment should not include meteorological conditions or their probabilities of occurrence (CURE 1999c). CURE further contends that they are not aware of any other public agencies or private organizations that allow or advocate the procedure used in the PSA (CURE 1999c). CURE suggests a method they would find acceptable for including meteorological conditions in a risk assessment and, without performing this analysis, CURE concludes that it would result in a significant impact that would need to be mitigated (CURE 1999c). Staff has developed the approach presented in their analysis after careful consideration. Staff makes use of all available field measurements, available documentation and reasonable modeling to evaluate the potential significant impacts of the proposed project. In staff’s opinion, it would be intellectually dishonest to ignore meteorological data that clearly has a significant impact on the outcome of this analysis. Therefore, staff concludes that the analysis provided by staff is technically correct and that the assertions made by CURE are unfounded.

In addition to spontaneous tank failure, accidental release of ammonia can also result from human error and external events. The primary human errors associated with release from fixed storage facilities occur during transfer operations. Additionally, leaks can occur due to improper inspection and maintenance. These

leaks will be from hoses, pipes or valves and are assumed to release significantly less material than the critical failure analyzed above. An accidental release of anhydrous ammonia of this magnitude, unmitigated will exceed the 2,000 ppm lethality endpoint on nearby Elk Hills Road (EHPP 1999d). The applicant estimated a probability of occurrence of a leak in the valve or piping associated with the anhydrous ammonia storage facility as approximately  $7.29 \times 10^{-2}$  over the 30 year life of the facility. However, staff researched this failure mode and concludes that the applicant has significantly over estimated the failure rate. A 1982 report (the Rijnmond Report) suggests that the failure rate of a serious leak is no more than  $1.0 \times 10^{-5}$  per year (Lees, F.P. 1996) and a catastrophic failure (complete loss of the storage tank) is no more than  $1.0 \times 10^{-6}$ . Furthermore, many of the possible events contributing to the Rijnmond value have already been addressed by the staff analysis. The remaining events are excess pressure and overfilling. The Lees failure rate does not take into account the more stringent US codes or the recent regulatory requirements included in the RMP and the Process Safety Management (PSM) Program which would significantly reduce the occurrence of these failure modes. Therefore, staff believes that the failure rate of  $1.0 \times 10^{-5}$  per year, or  $3.0 \times 10^{-4}$  over the 30 year life of the facility, is appropriately conservative to represent serious leaks from valves and pipes associated with the anhydrous ammonia storage tank.

Impacts associated with this release scenario reflect the concurrent occurrence of F stability and 1.5 meters per second wind speeds and assumes winds directly toward Elk Hills Road. From data presented in Air Quality Appendix K of the AFC (EHPP 1999a, page K-2-24) the probability of occurrence of F stability and winds speed less than 2.01 meters per second in any direction is 2.04%. Therefore, the maximum risk of impact from this release scenario is  $6.12 \times 10^{-6}$  over the life of the power plant, or 1 in 163,400 similar facilities in similar wind patterns over a period of 30 years. Staff believes that the potential for accidental releases will be reduced to insignificant levels by the implementation of safety management practices included in the RMP and PSM for the facility. These plans will be reviewed by Cal OSHA, the local Administering Agency, EPA, and Energy Commission staff prior to the handling of anhydrous ammonia at the facility. They include elements of employee training (initial and on-going), emergency response planning and management of change requirements. These elements, in staff's opinion, directly address the primary causes of accidental releases due to human error.

The external hazards potentially affecting the ammonia storage tank at this facility include; earthquakes, fires, explosions and turbine overspeed failure. Staff concludes that the potential for earthquake damage is sufficiently addressed by seismic code requirements. Staff has also determined that the anhydrous ammonia tank is located far enough from the natural gas pipeline, natural gas regulator and the combustion turbines that it will not be subject to fire, explosion, or overspeed hazards.

CURE has stated in their comments on the PSA, that failure or leaks in the valves and piping associated with the anhydrous ammonia storage facility are not addressed (CURE 1999c). These release modes are associated with human error during transfer operation and poor maintenance programs. Staff agrees that failure

or leaks from valves and piping were not explicitly identified in the PSA and have made corrections to the analysis to address CURE's concerns.

CURE has also stated that compliance with seismic codes does not ensure adequate protection from earthquake damage, correctly stating that these codes do not include an inspection and maintenance component (CURE 1999c). Inspection frequency and maintenance are not strictly specified in any codes, they are left to the discretion of the facility operator. Staff will propose in the Conditions of Certification that the inspection frequency and maintenance interval be identified and submitted with the PSM. However, compliance with seismic code does ensure adequate protection from earthquake damage. The design criteria use to develop the code is that essential facilities can be rendered inoperable but can not catastrophically fail, resulting in releases or endangerment of the public. Systems storing hazardous materials are classified in the most stringent category of seismic design code and thus are not expected to fail in a seismic event.

## **NATURAL GAS**

Natural gas, which will be used as a fuel by the project, poses a fire and/or explosion risk as a result of its flammability. While natural gas will be used in significant quantities, it will not be stored on site. The risk of a fire and/or explosion from natural gas can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) Code 85A requires: 1) the use of double block and bleed valves for gas shut-off; 2) automated combustion controls; and 3) burner management systems. These measures will significantly reduce the likelihood of an explosion in fired equipment. Additionally, start-up procedures will require air purging of the gas turbines prior to start-up, thus precluding the presence of an explosive mixture. This facility will also require the installation of a natural gas pipeline that could result in accidental release of natural gas. The natural gas pipeline is discussed in staff's **Facility Design** analysis. It is staff's belief that these mitigation measures will reduce to insignificant levels the potential for impacts associated with the use of natural gas.

## **HYDROGEN**

Staff may submit supplemental testimony that discusses potential impacts from the proposed hydrogen storage.

## **CUMULATIVE IMPACTS**

With the mitigation proposed, the facility will cause an insignificant risk of off-site impacts. A cogeneration power plant (known as 35R LOAP plant) located west of the EHPP proposed site is using and storing approximately 10,000 gallons of anhydrous ammonia. An off-site consequence analysis of the 35R storage tank will most likely result in slightly lower ammonia concentrations at Elk Hills Road, because it is farther way than the proposed site. The increase in risk from the EHPP anhydrous ammonia storage tank is very small (as previously discussed), thus the direct impacts of the project will not significantly add to any existing risk of an accidental release of anhydrous ammonia in the area.

## **FACILITY CLOSURE**

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The requirements for handling of hazardous materials remain in effect until such materials are removed from the site regardless of facility closure. Therefore, the facility owners are responsible for continuing to handle such materials in a safe manner, as required by applicable laws. In the event that the facility owner abandons the facility in a manner which poses a risk to surrounding populations, staff will coordinate with the California Office of Emergency services, Kern County Environmental Health Department, and the California Department of Toxic Substances Control (DTSC) to ensure that any unacceptable risk to the public is eliminated. Funding for such necessary emergency action can be obtained through DTSC's RAPID Program until the cost can be recovered from the responsible parties.

## **MITIGATION**

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With the exception of potential impacts associated with anhydrous ammonia, the proposed project reflects the use of all feasible methods in reducing the potential for impacts associated with hazardous materials use and handling. While the use of anhydrous ammonia does pose some small risk of impact, staff does not believe that the risk is sufficient to require further mitigation. However, if this risk is determined to be unacceptable, use of aqueous ammonia is a feasible mitigation that could be imposed.

CURE states in their comments on the PSA that the Process Safety Management (PSM) program is being used as mitigation, but does not require the project impacts to be mitigated (CURE 1999c). They claim that the PSM will not mitigate human error and thus will not reduce accidental releases due to human error (CURE 1999c). CURE offers no substantiation for this claim, but merely presents it as fact. Title 8, California Code of Regulations, section 5189 specifies the requirements for the PSM program. In part, this section includes requirements for operating procedures, employee training, mechanical integrity, management of change and emergency planning. It is staff's opinion that the specific requirements within this code are sufficient to reduce the accidental release of hazardous materials due to human error to insignificant levels. However, since the PSM is being relied on to a substantial degree, staff proposes to require all reporting elements of the PSM in the Conditions of Certification.

CURE has stated in their comments on the PSA that they believe that an additional Condition of Certification is necessary to require the water deluge system proposed for the anhydrous ammonia storage facility (CURE 1999c). CURE, in one statement, suggests that the water deluge system is needed to mitigate significant impacts (CURE 1999c). However, CURE goes on to say that the water deluge system is inadequate to mitigate the project impacts, and that more or alternate mitigation is necessary (CURE 1999c). The alternate mitigation CURE suggests is as follows: a double-walled tank, an enclosure for the storage tank, or the use of a subsurface tank (CURE 1999c). CURE has obscured the analysis staff provided and the conclusion staff reached regarding the anhydrous ammonia storage facility.

Staff concluded that there would be no significant impact from the anhydrous ammonia storage facility as proposed by the applicant. This conclusion was based on the risk of impact, not any potential mitigating factors from the water deluge system; the water deluge system is not required to reach staff's conclusion. Furthermore, based on this conclusion, staff can not support any further mitigation as proposed by CURE.

CURE has stated in their comments on the PSA that they believe that additional mitigation is necessary for the anhydrous ammonia unloading (or transfer) area (CURE 1999c). CURE provides no specific concern or analysis of this proposed project feature, but merely states, as fact, that the proposed anhydrous ammonia transfer area is insufficient to mitigate the project impacts (CURE 1999c). CURE states, "At a minimum, the unloading area should drain to an enclosed sump" (CURE 1999c). Staff has analyzed the proposed transfer area and the potential impacts from an accidental release of anhydrous ammonia as a result of human error (which is associated with the transfer area) and concluded that the Safety Management Plan is sufficient to reduce the risk of these potential impacts to insignificant levels. Based on this conclusion, staff can not support further mitigation for the transfer area. Additionally, a sump would be completely ineffective as mitigation for an anhydrous ammonia storage facility, due to the fact that an accidental release of anhydrous ammonia, which is stored under pressure, is typically an aerosol jet, not a liquid. Therefore, it is extremely unlikely that any of the released ammonia would enter the sump.

## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSION**

Staff's evaluation of hazardous materials handling and use for the proposed project indicates that they pose minimal potential for significant impacts on the public. With adoption of the proposed conditions of certification, EHPP will comply with all applicable LORS. In response to Health and Safety Code, section 25531 et seq., the applicant will be required to submit an RMP. The EPA, Kern County Environmental Health Department and staff will evaluate the RMP, including the hazardous materials storage and handling systems and the risk assessment provided by the applicant, and indicate whether they are satisfied with the proposed facilities. To insure adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by the Kern County Environmental Health Department and staff. In addition, staff's proposed conditions of certification also require that confirmation of Kern County Environmental Health Department's approval be submitted prior to delivery of any hazardous materials to the facility. With adoption of staff's proposed conditions of certification, the project will also comply with Health and Safety Code, section 41700, as it will not pose any potential for significant impacts to the public from hazardous materials releases.

## RECOMMENDATION

Staff recommends the Energy Commission impose the proposed conditions of certification presented herein to ensure that the project is designed, constructed and operated to comply with applicable LORS and to protect the public from significant risk of exposure to an accidental ammonia release.

CURE has stated in their comments on the PSA that they believe that Condition of Certification **HAZ-1** grants the compliance project manager (CPM) too broad authority to allow EHPP to use any hazardous materials in any quantities it desires (CURE 1999c). CURE cites the High Desert Power Project (HDPP) as the sole source of support for their position and concerns (CEC 1999c). The HDPP used aqueous ammonia and CURE was concerned that the applicant might change to using anhydrous ammonia at some later date. These concerns were addressed by including language in the HDPP Condition of Certification, **HAZ-1**, that required the exclusive use of aqueous ammonia. However, the last sentence of that Condition of Certification (CEC 1999c) is identical to the last sentence of the proposed Condition of Certification for the EHPP (**HAZ-1**). The Committee for the HDPP determined that the Conditions of Certification, including **HAZ-1**, provided adequate protection to the public health and safety (CEC 1999c).

EHP has suggested specific language changes to proposed Condition of Certification **HAZ-1** (EHPP 1999i). These changes would effectively reduce **HAZ-1** to requiring the applicant to report to the CPM only in the event of an accidental release. The intent of **HAZ-1** is to give the Commission direct control over what hazardous materials may be brought on the project site. The changes suggested by EHP do not address that intent, therefore staff opposes the suggested changes.

## PROPOSED CONDITIONS OF CERTIFICATION

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**HAZ-1** The project owner shall not use any hazardous material in reportable quantities, as specified in Title 40, Code Of Federal Regulations, Part 355, Subpart J, section 355.50, that are not identified in Appendix B unless approved in advance by the Compliance Project Manager (CPM).

**Verification:** The project owner shall provide to the CPM, in the Annual Compliance Report, a list of hazardous materials contained at the facility in reportable quantities.

**HAZ-2** The project owner shall provide a Process Safety Management Plan as specified in Title 8, California Code of Regulations, section 5189 et seq. At a minimum, the project owner shall include a full description per the referenced code section:

- Operating procedures
- Training
  - Initial training
  - Refresher/supplemental training

Certification and  
Testing  
Mechanical Integrity  
Written Procedures  
Inspection and Testing  
Equipment Deficiencies  
Quality Assurance  
Management of Change  
Incident Investigation  
Emergency Planning and Response, and  
Employee Participation

**Verification:** At least sixty (60) days prior to the delivery of any hazardous materials to the facility, the project owner shall provide the CPM with the project Process Safety Management Plan as referenced to code for approval.

**HAZ-3** The project owner shall provide a Risk Management Plan and Process Safety Management Plan (as described in Condition **HAZ-2**) to Kern County Environmental Health Department and the CPM for review and approval at the time the plans are first submitted to the U.S. Environmental Protection Agency (EPA) and the California Occupational Safety and Health Administration (Cal OSHA). The project owner shall reflect all recommendations of the Kern County Environmental Health Department in the final document. A copy of the final plans, reflecting all comments, shall be provided to the Kern County Environmental Health Department and the CPM once reviewed by EPA and Cal OSHA.

**Verification:** At least sixty (60) days prior to the delivery of any hazardous materials to the facility, the project owner shall provide the final approved plans listed above for CPM approval. The project owner shall revise the Process Safety Management Plan and the Risk Management Plan as required by code.

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## HAZARDOUS MATERIAL MANAGEMENT

### Appendix A

#### BASIS FOR STAFF'S USE OF 75 PPM AMMONIA EXPOSURE CRITERIA

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Staff uses a criterion of 75 ppm to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this criterion is not consistent with the 200-ppm criterion used by EPA and Cal EPA in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's CEQA analysis. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices are implemented and actions are taken in response to accidental releases. However, the regulations implementing these programs do not provide clear authority to require design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines (ERPGs) states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to healthy adult individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations), they are not appropriate for, and are not binding on, discretionary decisions involving proposed facilities where many options for mitigation are feasible. CEQA requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through changes to the proposed project.

Staff has chosen to use the National Research Council's 30 minute Short Term Public Emergency Limits (STPELs) to determine the potential for significant impact. These limits are designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at these levels should not result in "serious sequelae" but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures of the general public to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events, and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL.

## HAZARDOUS MATERIAL MANAGEMENT

### APPENDIX A TABLE 1

#### Acute Ammonia Exposure Guidelines

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH <sup>2</sup>	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 min.	Exposure above this level requires the use of "highly reliable" respiratory protection and poses the risk of death, serious irreversible injury or impairment of the ability to escape.
IDLH/10 <sup>1</sup>	EPA, NIOSH	Work place standard adjusted for general population factor of 10 for variation in sensitivity	30 ppm	30 min.	Protects nearly all segments of general population from irreversible effects
STEL <sup>2</sup>	NIOSH	Adult healthy male workers	35 ppm	15 min. 4 times per 8 hr day	No toxicity, including avoidance of irritation
EEGL <sup>3</sup>	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 min.	Significant irritation but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one time exposure
STPEL <sup>4</sup>	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 min. 30 min. 10 min.	Significant irritation but protect nearly all segments of general population from irreversible acute or late effects. One time accidental exposure
TWA <sup>2</sup>	NIOSH	Adult healthy male workers	25 ppm	8 hr.	No toxicity or irritation on continuous exposure for repeated 8 hr. work shifts
ERPG-2 <sup>5</sup>	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 min.	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin)

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)

\* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.

\*\* The (NRC 1979) describes a study involving young animals which suggests greater sensitivity to acute exposure in young animals. The (WHO 1986) warns that the young, elderly, asthmatics, those with bronchitis and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

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## ABBREVIATIONS

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ACGIH, American Conference of Governmental and Industrial Hygienists  
AIHA, American Industrial Hygienists Association  
EEGL, Emergency Exposure Guidance Level  
EPA, Environmental Protection Agency  
ERPG, Emergency Response Planning Guidelines  
IDLH, Immediately Dangerous to Life and Health Level  
NIOSH, National Institute of Occupational Safety and Health  
NRC, National Research Council  
STEL, Short Term Exposure Limit  
STPEL, Short Term Public Emergency Limit  
TLV, Threshold Limit Value  
WHO, World Health Organization

## HAZARDOUS MATERIAL MANAGEMENT

### Appendix B

Material	Use	Quantity Stored On-Site
Anhydrous Ammonia	NOx emission control	12,000 Gallons
Organic Phosphate Inhibitor Solution	Circulating water scale control	4,000 Gallons
Sodium Hypochlorite Solution	Circulating water biofouling control	2,500 Gallons
Sulfuric Acid	Circulating water pH reduction and demineralizer regeneration	7,500 Gallons
Sodium Hydroxide	Demineralizer regeneration	7,500 Gallons
Oxygen Scavenger Solution	Condensate oxygen control	250 Gallons
Alkaline Solution (e.g. Amine)	Condensate pH control	250 Gallons
Disodium and Trisodium Hydrochloric acid	Boiler water scale control	1,000 Gallons
Ammonium Bifluoride	HRSG chemical cleaning	Temporary
Citric Acid	HRSG chemical cleaning	Temporary
EDTA Chelant	HRSG chemical cleaning	Temporary
Sodium Nitrate	HRSG chemical cleaning	Temporary
Diesel Fuel Oil	Diesel fire pump	100 Gallons
Sulfuric Acid	Station batteries	3,000 Gallons
Hydrogen	Generator cooling	60,000 standard cubic feet

EHPP 1999a, AFC Table 3.4-4, Page 3-4

# WASTE MANAGEMENT

Testimony of Mike Ringer

## INTRODUCTION

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This analysis presents an assessment of issues associated with managing wastes generated from constructing and operating the Elk Hills Power Project (EHPP). It evaluates the proposed waste management plans and mitigation measures designed to reduce the risks and environmental impacts associated with handling, storing, and disposing of project-related hazardous and nonhazardous wastes. The technical scope of this analysis encompasses wastes generated during facility construction and operation, except wastewaters discharged to injection wells. Such wastewaters are discussed in the Soil and Water Resources section of this document.

Energy Commission staff's objectives in its waste management analysis are to ensure that:

- the management of wastes will be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during constructing and operating the proposed project will be managed in an environmentally safe manner; and
- disposal of project wastes will not result in significant adverse impacts to existing waste disposal facilities.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS

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### FEDERAL

#### ***RESOURCE CONSERVATION AND RECOVERY ACT (42 U.S.C. SEC.6921 ET SEQ.)***

The Resource Conservation and Recovery Act establishes requirements for the management of hazardous wastes from the time of generation to the point of ultimate treatment or disposal. Section 6922 requires generators of hazardous waste to comply with requirements regarding:

- record keeping practices which identify quantities of hazardous wastes generated and their disposition,
- labeling practices and use of appropriate containers,
- use of a manifest system for transportation, and
- submission of periodic reports to the EPA or authorized state.

## ***TITLE 40, CODE OF FEDERAL REGULATIONS, PART 260***

These sections contain regulations promulgated by the EPA to implement the requirements of RCRA as described above. Characteristics of hazardous waste are described in terms of ignitability, corrosivity, reactivity, and toxicity, and specific types of wastes are listed.

## **STATE**

### ***CALIFORNIA HEALTH AND SAFETY CODE, SECTION 25100 ET SEQ. (HAZARDOUS WASTE CONTROL ACT OF 1972, AS AMENDED).***

This act creates the framework under which hazardous wastes must be managed in California. It mandates the State Department of Health Services (now the Department of Toxic Substances Control under the California Environmental Protection Agency, or Cal EPA) to develop and publish a list of hazardous and extremely hazardous wastes, and to develop and adopt criteria and guidelines for the identification of such wastes. It also requires hazardous waste generators to file notification statements with Cal EPA and creates a manifest system to be used when transporting such wastes.

### ***TITLE 14, CALIFORNIA CODE OF REGULATIONS, SECTION 17200 ET SEQ. (MINIMUM STANDARDS FOR SOLID WASTE HANDLING AND DISPOSAL)***

These regulations set forth minimum standards for solid waste handling and disposal, guidelines to ensure conformance of solid waste facilities with county solid waste management plans, as well as enforcement and administration provisions.

### ***TITLE 22, CALIFORNIA CODE OF REGULATIONS, SECTION 66262.10 ET SEQ. (GENERATOR STANDARDS)***

These sections establish requirements for generators of hazardous waste. Waste generators must determine if their wastes are hazardous according to specified characteristics or lists of hazardous wastes. As in the federal program, hazardous waste generators must obtain EPA identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Additionally, generators must use registered hazardous waste transporters for any off-site shipments. Requirements are also established for record keeping, reporting, packaging, and labeling of hazardous wastes, use of containers and tanks for hazardous waste storage, and limiting the amount of time that hazardous waste can be stored on site.

## **LOCAL**

### ***KERN COUNTY GENERAL PLAN PUBLIC FACILITIES ELEMENT***

All generators and processors of hazardous waste are encouraged to develop long-term waste management programs. Large generators of hazardous waste should be encouraged to recycle, treat and detoxify their wastes on site. Many such processes could be implemented in existing industrial map designations, if zoned appropriately (Policy No. 17).



## SETTING

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### PROJECT AND SITE DESCRIPTION

The proposed site is on about 12 acres in the center of the Elk Hills Oil and Gas Field, about 25 miles west of Bakersfield. The site is currently occupied by out-of-service tanks and related equipment formerly used for storage and loading of propane, butane, and natural gas liquid products. In addition, there are some aboveground pipelines that cross the power plant site. Please see the Project Description section for a more detailed description of the project and site.

The owner of the site, Occidental of Elk Hills, Inc., commissioned a Phase I Environmental Site Assessment (ESA), the purpose and scope of which was to determine if there is a reason to suspect the possibility of contamination at the site. (EHPP 1999a, AFC Appendix H). The ESA was performed in accordance with American Society for Testing and Materials practice E 1527-97, and included the following tasks:

- a review of current and past uses of the property since 1956;
- a site reconnaissance to assess evidence of current and/or past use or storage of toxic or hazardous material; on-site ponds, landfills, drywells, waste streams, or other disposal units; visible soil discoloration; aboveground or underground storage tanks; electrical transformers containing polychlorinated biphenyls; and drums, barrels and other storage containers;
- a visual review of adjacent properties and facilities to assess their potential to adversely impact the site;
- a review of readily available federal and state Environmental Protection Agency lists of known or potential hazardous waste sites or landfills, and sites currently under investigation for environmental violations in the site area;
- contact with county agencies to review available records and permits; and
- a review of environmental data for the oilfield as maintained and supplied by Occidental of Elk Hills, Inc. and the predecessor operating companies for Naval Petroleum Reserve No. 1.

The ESA did not find any evidence that the property had ever been used for any purpose other than oilfield related gas storage, and there is no record of well drilling in the property. A review of adjacent properties disclosed no hazardous waste sites or discharges which would affect the proposed cogeneration site, and no evidence of any likelihood for any facilities on surrounding properties to have created a current recognized environmental condition of the proposed site.

The ESA reports that no hazardous substances nor unidentified containers were observed on the property; no ground staining indicative of hazardous substances was observed, other than minimal staining from hydrocarbons such as from leaking trucks; there were no indications of solid waste disposal on the site; and there were no other visible indications of any conditions of concern. Additionally, reviews of

relevant environmental databases and regulatory agency records did not find any evidence to suggest that any contamination might exist at the site. The ESA concluded that no on-site or off-site recognized environmental conditions were identified, and that no further investigation is required.

Based on results of the Phase I ESA, staff concludes that there is a low probability of significant contamination at the proposed site. However, staff recognizes that there remains a possibility that unexpected contamination may be discovered during project construction, which may then require further analyses and possible corrective measures. Therefore, staff proposes Condition of Certification **WASTE-4** which would require a qualified environmental professional to assess the nature and extent of any suspected contamination found during construction.

## **IMPACTS**

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### **PROJECT SPECIFIC IMPACTS**

#### **CONSTRUCTION**

Project construction will generate both hazardous and nonhazardous wastes. The applicant estimates that up to 600 tons of nonhazardous solid wastes will be generated during construction of the power plant and associated linear facilities (EHPP 1999a, AFC p. 5.13-5). Nonhazardous wastes include debris requiring removal during site grading and excavation, excess lumber and concrete, scrap metal from welding and cutting operations, insulation, empty chemical containers, and paper, wood, glass, and plastic from packing materials. Those wastes which cannot be recycled will be disposed of at a Class III (nonhazardous) landfill. (Id.)

Hazardous wastes that may be generated during construction include waste oil and grease, paint, spent solvent, welding materials, and clean-up materials from spills of hazardous substances. Such wastes will be collected in hazardous waste accumulation containers near the point of generation. The containers will be taken to the construction contractor's hazardous waste storage area and within 90 days, will either be recycled or transported by a licensed hauler to licensed hazardous waste treatment and disposal facilities, as appropriate (EHPP 1999a, AFC p. 5.13-9). Initial cleaning of the heat recovery steam generators will also generate waste cleaning solutions. Washwater effluent will be temporarily stored on site in portable tanks and disposed of off site by the licensed chemical cleaning contractor.

Wastes may also be generated if contaminated soils are encountered during demolition or excavation. If such soil is found, it will be segregated, sampled, and tested. Hazardous soil will be hauled to a Class I landfill or appropriate soil treatment and recycling facility. (Id.) The Kern County Environmental Health Services Department will be notified if underground storage facilities are discovered during construction.

## **OPERATION**

Under normal operating conditions, the proposed facility will generate both nonhazardous and hazardous wastes.

Nonhazardous wastes generated during plant operation include trash, office wastes, empty containers, broken or used parts, used packing material, used filters, spent demineralizer resin, and cooling tower basin sludge. On a daily basis, the quantities of other nonhazardous wastes generated from gas-fired facilities, such as the EHPP, are typically minor, with some of the material being recyclable. The applicant estimates that approximately 100 tons of solid waste will be generated on an annual basis (EHPP 1999a, AFC p. 5.13-6). Nonhazardous waste will be recycled where practical and the remainder disposed of to a Class III (nonhazardous) landfill.

Hazardous wastes generated during routine project operation include cleaning solutions, spent air pollution control catalyst, used oil, used cleaning solvents, waste paint, contaminated clean-up materials, and empty chemical containers.

Selective catalytic reduction catalyst, used for NO<sub>x</sub> emissions control, must be replaced as it becomes contaminated, typically after several years' of service. Classified as hazardous due to heavy metals content, Elk Hills estimates that about 70,000 pounds of spent catalyst will be returned to the manufacturer for reclamation or disposal every three to five years (EHPP 1999a, AFC p. 5.13-10).

About 1,300 gallons of used crankcase and hydraulic oil will be generated annually and will be recycled by a licensed oil recycler (EHPP 1999a, AFC p. 5.13-10). Oily rags and oil absorbent, used to contain small spills, will be collected near the point of generation and disposed of off site in a hazardous waste landfill, although the rags may be sent to an industrial cleaning service.

Used containers of hazardous substances, such as chemical containers or oil filters may be classified as hazardous wastes. However, if managed according to certain regulatory guidelines, such containers may be managed as nonhazardous (Cal. Code Regs., tit. 22, § 66261.7, 66266.130).

## ***IMPACT ON EXISTING WASTE DISPOSAL FACILITIES***

The Kern County Department of Waste Management owns and operates five class III (nonhazardous) landfills within 50 miles of the proposed project (EHPP 1999a, AFC Table 5.13-1). EHPP's projected generation of solid waste (600 tons during construction and 100 tons annually) is an insignificant fraction of the landfills' combined annual capacity of over 500,000 tons or their remaining capacity of almost eleven million tons. Even discounting the effects of recycling on the total amount of nonhazardous wastes destined for landfilling, staff concludes that the amount of such wastes generated during project construction and operation are insignificant relative to existing disposal capacity, and would not meaningfully impact any of the landfills' capacities or operating lifetimes.

Three Class I landfills in California are permitted to accept hazardous waste (EHPP 1999a, AFC p. 5.13-3):

- Safety-Kleen's Buttonwillow facility in Kern County, with a permitted capacity of 13 million tons and an estimated remaining life of 40 years.
- Chemical Waste Management's Kettleman Hills landfill in Kings County, with a remaining capacity of about eight million cubic yards, and a remaining life of about 30 years.
- Safety-Kleen's Superstition Hills landfill in Imperial County, with an estimated remaining capacity of two million cubic yards and a remaining life of 50 years.

Much of the hazardous waste generated during facility construction and operation, such as used oil and spent catalysts, will be recycled. Even without recycling, however, amounts of hazardous waste generated by this type of facility is minor and would not significantly impact the capacity of any of the above Class I landfills.

## **CUMULATIVE IMPACTS**

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Staff's assessment of cumulative impacts includes wastes generated by the proposed La Paloma, Sunrise, and Midway-Sunset projects in addition to EHPP. As mentioned above, combined cycle projects similar to EHPP do not generate significant amounts of either hazardous or nonhazardous wastes, and much of what is generated will be recycled. Discounting the effects of recycling, construction wastes are estimated to be less than 2,500 tons (total) and operational wastes less than 6,000 tons (annually), compared to a total annual capacity of over 500,000 tons for Kern County landfills. Due to the minor amounts of wastes generated during project construction and operation and the availability of regional landfills, cumulative impacts will be insignificant for both hazardous and nonhazardous wastes.

## **FACILITY CLOSURE**

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During any type of facility closure (see staff's General Conditions section which discusses planned, unexpected temporary, and unexpected permanent closure), the primary waste management related concern is that project wastes not pose any potentially significant problem to the public, workers, or the environment. Staff has determined that conditions of certification in the General Conditions section will adequately address waste management issues related to closure.

In the case of unexpected temporary closure, waste management practices normally required by LORS and already in place (such as limiting hazardous waste accumulation time to 90 days and requiring proper containment) would likely be adequate to avoid significant problems. In addition, staff's General Conditions for Facility Closure require preparation of an on-site contingency plan which shall provide for removal of hazardous wastes and draining of all chemicals from storage tanks and other equipment for temporary closures exceeding 90 days.

An approved on-site contingency plan is also required to protect public health and safety in the case of unexpected permanent closure. As above, the plan must provide for the removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment, and the safe shutdown of all equipment.

For planned permanent closure, Elk Hills is required to develop a facility closure plan at least twelve months prior to commencement of closure.

## **COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)**

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Energy Commission staff concludes that EHPP will be able to comply with all applicable LORS regulating the management of hazardous and nonhazardous wastes during project construction and operation. Because hazardous wastes will be produced during project construction and operation, Elk Hills must acquire and maintain an EPA identification number as a hazardous waste generator. Accordingly, Elk Hills will be required to properly store, package and label waste, use only approved transporters, prepare hazardous waste manifests, and keep detailed records. Pursuant to California Code of Regulations, title 22, section 67100.1 et seq., a hazardous waste source reduction and management review may be required, depending on the amounts of hazardous waste ultimately generated.

## **MITIGATION**

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Elk Hills intends to implement the following mitigation measures during construction and operation of the proposed project (EHPP 1999a, AFC pp. 5.13-11,12):

- A detailed hazardous waste management plan will be prepared prior to start-up to assure proper storage, labeling, packaging, record keeping, manifesting, minimization, and disposal of hazardous waste.
- Procedures to minimize hazardous waste generation will be established. Nonhazardous materials will be used instead of hazardous materials and wastes will be recycled whenever possible.
- Chemical spill control and management procedures will be included in a spill contingency plan developed prior to commercial operation.

Energy Commission staff has examined the mitigation measures proposed by Elk Hills and concluded that the measures together with applicable LORS will adequately assure that no significant environmental impacts will result from the management and disposal of project-related waste.

In the project application phase, certain details concerning plant construction and operation remain to be finalized, including specific methods of waste management. Elk Hills has proposed general methods of managing project related wastes, which

staff concludes are adequate to prevent significant environmental impacts. However, staff will propose that Elk Hills prepare a waste management plan which will specify how project wastes will be managed once all details of plant operation are determined (see proposed condition of certification **WASTE-3**).

## CONCLUSIONS AND RECOMMENDATIONS

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Management of the wastes generated during construction and operation of the EHPP project will not result in any significant adverse impacts if Elk Hills implements the mitigation measures proposed in the Application for Certification (99-AFC-1), the additional measure proposed by staff below, and the proposed conditions of certification.

Staff recommends that if potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities as evidenced by discoloration, odor, or other signs, Elk Hills has an environmental professional (as defined by American Society for Testing and Materials practice E 1527-93 Standard Practice for Phase I environmental Site Assessments) determine the need for sampling to confirm the nature and extent of contamination. If significant remediation may be required, Elk Hills should also contact representatives of the Kern County Environmental Health Services Department and the Sacramento Field Office of the California Department of Toxic Substances Control for possible oversight.

## CONDITIONS OF CERTIFICATION

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**WASTE-1** The project owner shall obtain a hazardous waste generator identification number from the Department of Toxic Substances Control prior to generating any hazardous waste.

**Verification:** The project owner shall keep its copy of the identification number on file at the project site and notify the CPM via the monthly compliance report of its receipt.

**WASTE-2** Upon becoming aware of any impending enforcement action which may compromise the proper management of project related wastes, the project owner shall notify the CPM of any such action taken or proposed to be taken against it, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

**Verification:** The project owner shall notify the CPM in writing within 10 days of becoming aware of an impending enforcement action.

**WASTE-3** Prior to the start of both construction and operation, the project owner shall prepare and submit to the CPM, for review and comment, a waste management plan for all wastes generated during construction and operation of the facility, respectively. The plans shall contain, at a minimum, the following:

- a description of all waste streams, including projections of frequency, amounts generated and hazard classifications; and
- methods of managing each waste, including treatment methods and companies contracted with for treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/reduction plans.

**Verification:** No less than 60 days prior to the start of construction, the project owner shall submit the construction waste management plan to the CPM for review. The operation waste management plan shall be submitted no less than 60 days prior to the start of project operation. The project owner shall submit any required revisions within 30 days of notification by the CPM (or mutually agreed upon date). In the Annual Compliance Reports, the project owner shall document the actual waste management methods used during the year compared to planned management methods.

**WASTE-4** The project owner shall have an environmental professional (as defined by American Society for Testing and Materials practice E 1527-97 Standard Practice for Phase I environmental Site Assessments) available for consultation during soil excavation activities. If potentially contaminated soil is unearthed during excavation at either the proposed site or linear facilities as evidenced by discoloration, odor, or other signs, prior to any further construction activity at that location, the environmental professional shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and file a written report to the project owner stating the recommended course of action. If, in the opinion of the environmental professional, significant remediation may be required, the project owner shall contact representatives of the Kern County Environmental Health Services Department and the Sacramento Field Office of the California Department of Toxic Substances Control for guidance and possible oversight.

**Verification:** The project owner shall notify the CPM in writing within 5 days of any reports filed by the environmental professional, and indicate if any substantive issues have been raised.

## REFERENCES

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EHPP (Elk Hills Power Project). 1999a. Application for Certification, Elk Hills Power Project, (99-AFC-1). Submitted to the California Energy Commission, February 24, 1999.





# LAND USE

Testimony of Amanda Stennick

## INTRODUCTION

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The land use analysis of the Elk Hills Power Project (EHPP) focuses on two main issues: the project's consistency with local land use plans, ordinances and policies; and the project's compatibility with existing and planned land uses. Indirect land use impacts such as noise, traffic, visual resources, air quality, biology, transmission line safety and nuisance, or public health are discussed in those specific areas of this staff assessment.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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### KERN COUNTY GENERAL PLAN

The general plan is the legal document that acts as a constitution for land use and development in Kern County. It consists of the seven mandatory elements: land use, circulation, open space, conservation, housing, safety and seismic safety, and noise; and four optional elements: recreation, energy, hazardous waste management, and public services and facilities (Kern County 1994). The following land use designations of the Kern County General Plan are specific to the proposed project.

### ***LAND USE DESIGNATIONS***

#### NONJURISDICTIONAL LAND

State and Federal Land - All property under the ownership and control of various state and federal agencies.

#### RESOURCE

#### ***Intensive Agriculture***

Applies to areas devoted to the production of irrigated crops or having the potential for such use. Other agricultural uses may be consistent with the intensive agriculture designation. Minimum parcel size is 20 acres gross. Permitted uses include, but are not limited to:

- Primary: irrigated cropland, orchards, vineyards, ranch and farm facilities, etc.; one single-family dwelling unit.
- Compatible: livestock grazing, water storage, mineral and petroleum exploration and extraction, and public utility uses, etc., pursuant to provisions of the Zoning Ordinance.

### ***Extensive Agriculture***

Applies to agricultural uses involving large amounts of land with relatively low value-per-acre yields. Minimum parcel size is 20 acres gross, except lands not under Williamson Act Contract, in which case the minimum parcel size shall be 80 acres gross. Permitted uses include, but are not limited to:

- Primary: livestock grazing, dry land farming, ranching facilities, wildlife and botanical preserves, timber harvesting, etc.; one single-family dwelling unit.
- Compatible: irrigated croplands, water storage or ground water extraction, recharge areas, mineral and petroleum exploration, recreational activities, etc.

### ***Mineral And Petroleum***

Applies to areas, which contain producing, or potentially productive, petroleum fields and mineral deposits. Uses are limited to activities directly associated with resource extraction. Minimum parcel size is 5 acres gross. Permitted uses include, but are not limited to:

- Primary: mineral and petroleum exploration and extraction.
- Compatible: extensive and intensive agriculture, mineral and petroleum processing, pipelines, power transmission facilities, communication facilities, equipment storage yards, and one single-family dwelling unit (subject to a Conditional Use Permit).

### **PUBLIC FACILITIES**

Applies to areas designated for basic physical structures and infrastructure including roads, water distribution and large storage systems, sewage collection and treatment facilities, and flood control and storm drainage systems.

### **PHYSICAL CONSTRAINTS**

Includes overlay zones denoting physical constraints. Those applicable include:

- Steep Slopes: Land with an average slope of 30 percent or steeper.
- Flood Hazard: Based on the Flood Hazard Boundary Maps of the US Department of Housing and Urban Development and the Kern County Water Agency. These areas include, for example, flood channels and watercourses, riverbeds, and gullies. Development within these areas is subject to review by the County and will include conformity with adopted ordinances.

### **SPECIAL TREATMENT AREAS**

These are areas for which area-wide land use plans have been prepared or approved. They include both "Accepted County Plan Areas" and "Rural Community" plans:

- Accepted County Plan Areas: Specific land use areas for which plans have been prepared and approved.
- Rural Community: Settlements in the County that have individual character and are recognized as unique communities meriting Specific Plan level of detail.

#### **INDUSTRIAL**

Commercial and industrial activities which involve outdoor storage or use of heavy equipment which produces significant air or noise pollution.

The following tables indicate the Kern County General Plan land use designations and existing land uses of the proposed project and transmission line corridors.

### ***GENERAL PLAN LAND USE DESIGNATIONS WITHIN THE STUDY AREA***

The existing general plan land use designations for the facility are represented in LAND USE Table 1.

**LAND USE Table 1**

<b>Location or Linear Facility</b>	<b>Land Use Designation</b>
Elk Hills Power Plant	Mineral and Petroleum
Transmission Line Route 1A	Mineral and Petroleum/Special Treatment Areas/Mineral and Petroleum-Flood Hazard
Transmission Line Route 1B and 1B Variation	Mineral and Petroleum/Extensive Agricultural/Intensive Agricultural
Water Supply Line Route 2	Mineral and Petroleum/Non-Jurisdictional Land/Extensive Agricultural/ Mineral and Petroleum-Flood Hazard/Public Facilities-Flood Hazard
Wastewater Supply Line Route 3	Mineral and Petroleum
Natural Gas Supply Line Route 4	Extensive Agricultural/Mineral and Petroleum

### ***EXISTING LAND USES WITHIN THE STUDY AREA***

The existing land uses for the facility are represented in LAND USE Table 2.

**LAND USE Table 2**

<b>Location or Linear Facility</b>	<b>Existing Land Uses</b>
Elk Hills Power Plant	Oil and Gas Production
Transmission Line Route 1A	Oil and Gas Production/Undeveloped/School/Church/Residential
Transmission Line Route 1B and 1B Variation	Commercial/Oil and Gas Production/Conservation/Undeveloped/Agricultural/Rural Residences
Water Supply Line Route 2	Oil and Gas Production/Undeveloped/ West Kern Water District Distribution Center
Wastewater Supply Line Route 3	Oil and Gas Production
Natural Gas Supply Line Route 4	Oil and Gas Production

## ***LAND USE PLANS AND POLICIES RELATED TO EHPP***

The following provisions of the Kern County General Plan, McKittrick Rural Community Plan, Buttonwillow Community Development Plan, U.S. Fish and Wildlife Service, and Caliente Resource Management Plan are specific to the proposed project. Please refer to the Socioeconomic Resources and Noise sections of the Preliminary Staff Assessment (PSA) for a discussion of the applicable policies of the Kern County General Plan. Please refer to the Biological Resources section of the PSA for a discussion of the applicable policies of the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

### **NONJURISDICTIONAL LAND**

- Coordination and cooperation will be promoted among the County, the incorporated cities and the various special districts where their planning decisions and actions affect more than a single jurisdiction (Policy No. 1).
- Land under state and federal jurisdiction will be considered as land designated for "Resource Management" on the General Plan map (Policy No. 4).

### **PHYSICAL CONSTRAINTS**

- Kern County will not permit new developments to be sited on land that is environmentally unsound to support such development (Policy No. 1).
- Development will not be allowed in natural hazard areas pending the adoption of ordinances that establish conditions, criteria and standards in order to minimize risk to life and property posed by those risks (Policy No. 2).
- Zoning and other land use controls will be used to regulate and, in some instances, to prohibit development in hazardous areas (Policy No. 3).
- New development will not be permitted in areas of landslide or slope instability as designated in the Safety and Seismic Safety Element of the General Plan, and as mapped on the Kern County Seismic Hazard Atlas (Policy No. 6).
- Regardless of percentage of slope, development on hillsides will be sited in the least obtrusive fashion, thereby minimizing the extent of topographic alteration required (Nonjurisdictional Land - Policy No. 1, p. 1 - Policy No. 9)
- Development proposed in areas with steep slopes will be reviewed for conformity to the adopted Hillside Development Ordinance to ensure that appropriate stability, drainage, and sewage treatment will result (Policy No. 10).
- Designated flood channels and watercourses, such as creeks, gullies, and riverbeds will be preserved as resource management areas or, in the case of the urban areas, as linear parks (Policy No. 12).
- New development will be required to demonstrate the availability of adequate fire protection and suppression facilities (Policy No. 13).
- Kern County will evaluate the potential noise impacts of any development-siting action or of any applications it acts upon that could significantly alter noise

levels in the community and will require mitigative measures where significant adverse effects are identified (Policy No. 14).

- The air quality effects of a proposed land use will be considered when evaluating development proposals (Physical Constraints - Policy No. 15, p. 2-3).
- Kern County will disapprove projects found to have significant adverse effects on Kern County's air quality, unless the Board of Supervisors, Board of Zoning Adjustment, or the Director of Planning and Development Services, acting as Hearing Officer or Parcel Map Advisory Agency makes findings under CEQA (Policy No. 16).

#### **SPECIAL TREATMENT AREAS**

- In areas designated "Specific Plan Required" with more than one owner, the interim designations will reflect the existing zoning pattern until the County prepares and adopts a Specific Plan (Policy 3(b)).

#### **RESOURCE**

- Areas designated agricultural use, which include Class I and II agricultural soils with surface water delivery systems will be protected against residential and commercial subdivision and development activities (Policy No. 1).
- Areas identified by the Soil Conservation Service as having high range-site value will be reserved for extensive agricultural use or as resource reserves if located within a County water district (Policy No. 2).
- In areas with a Resource designation on the General Plan map, only industrial activities which directly and obviously relate to the exploration, production, and transportation of the particular resource will be considered to be consistent with this plan (Policy No. 4).
- Development will be constrained, pending adoption of ordinances, which establish conditions, criteria, and standards, in areas containing valuable resources in order to protect the access to and economic use of these resources (Policy No. 9).
- Rivers and streams in the County are important visual and recreational resources and wildlife habitats. Areas of riparian vegetation along rivers and streams will therefore be preserved when feasible to do so (Policy No. 11).
- The County will maintain and enhance air quality for the health and well being of County residents by encouraging land uses which promote air quality and good visibility (Policy No. 13).
- Habitats of threatened or endangered species should be protected to the greatest extent possible (Policy No. 14).
- Management which are presently under Williamson Act Contracts will have a minimum parcel size of 80 acres until such time as a contract expires or is canceled, at which time the minimum parcel size will become 20 acres (Policy No. 15).

## **GENERAL PROVISIONS**

- Prior to issuance of any development or use permit, the County shall make the finding, based on information provided by California Environmental Quality Act (CEQA) documents, staff analysis, and the applicant, that adequate public or private services and resources are available to serve the proposed development. The developer shall assume full responsibility for costs incurred in service extensions or improvements that are required as a result of the proposed project (Policy No. 3).
- The air quality implications of new development will be considered in approval of major developments or area wide land use designations (Policy No. 15).
- The County will promote the preservation of designated historic buildings and the protection of cultural resources which provide ties with the past and constitute a heritage value to residents and visitors (Policy No. 16).
- Maintain the County's inventory of areas of potential cultural and archaeological significance (Implementation G).

## **MCKITTRICK RURAL COMMUNITY PLAN**

The McKittrick Rural Community Plan has been developed using the criteria, goals, policies, and implementing ordinances of the Kern County General Plan. Programs and document framework for the McKittrick Plan are the same as those used in the Kern County General Plan.

## **BUTTONWILLOW COMMUNITY DEVELOPMENT PLAN**

## **OPEN SPACE**

- Encourage continuing dual use of transmission line easements as open space or possibly greenbelt areas (Implementation P. 23).
- Continuance of land use contracts under the provisions of the Williamson Act and maintenance of the A (Exclusive Agricultural) zoning classification for agricultural lands (Implementation, P. 25).
- Encourage continuance of land use contracts under the provisions of the California Land Conservation Act of 1965, as amended, and commonly referred to as "The Williamson Act" (Implementation, P. 30).

## **FISH AND WILDLIFE**

- Encourage programs to locate and determine populations of rare and endangered species (Implementation, P. 85).

***Resource Policy and Management Guidance***

- All lands in the resource area are available for cooperative management agreements with local governments and/or private organizations, provided that proposed management conforms to plan objectives and land use allocations (Policy No. 14).
- BLM shall not jeopardize the continued existence of any plant or animal that is listed as threatened or endangered by the federal or state government, or is either proposed for listing or is a candidate for listing by the federal government (Policy No. 19).
- Efforts to avoid adverse effects to cultural resources will be implemented (Policy No. 26).
- Proposals for future development activities will require additional NEPA analysis (Policy No. 27).
- Protection of paleontological resources will include the assessment of the threat to these resources, along with the implementation of measures designed to mitigate these impacts (Policy No. 27).
- The authorized office may approve the use of motor vehicles on any public lands in the resource area (Policy No. 40).

***Resource Guidance And Decisions***

- Improve the management efficiency of federal lands, improve resources protection and provide lands for public and private uses through land tenure adjustment (Objective No. 5).
- Accommodate requests for land use authorizations while minimizing residual impacts to sensitive resources (Objective No. 6).
- Manage public lands to enhance, protect and minimize impacts to sensitive resources, including cultural and paleontological resources; and air and water quality (Objective No. 10).

***Resource Area-Wide Allocations***

- Unless otherwise identified, all public lands shall be retained in federal ownership (Allocation No. 1).
- Lands where BLM manages the mineral estate only (split estate lands) will be available for exchange through Section 206 of the Federal Land Policy Management Act (FLPMA), on a case by case basis (Allocation No. 6).
- Management Action shall conform to Visual Resource Management (VRM) classifications (Allocation No. 22).

- Activities on public land, including construction, road maintenance and improvement, oil development, pipeline corridors, and powerline corridors must comply with local Air Pollution Control District requirements (Allocation No. 29).

***Lokern Area of Critical Environmental Concern (ACEC)***

- Cooperative of local landowners and local, state, and federal government agencies to manage the Lokern ACEC as a natural ecosystem for the benefit of threatened and endangered species and their habitats, while recognizing the rights and needs of authorized users of public land.

***Management Prescriptions***

- This ACEC is open for leasing of oil, gas, and geothermal resources subject to the following stipulation: LSU-Protected Species, LSU-Sensitive Species.

**PUBLIC FACILITIES**

- In evaluating a development application, Kern County will consider impacts on the local school district(s) (Policy No. 8).
- A large part of the short-term threat to public health and local government resources is due to transportation of hazardous waste (as well as hazardous material in general). Disposal capacity will be permitted for waste streams which minimize the volume and distance of transportation (Policy No. 13).
- All generators and processors of hazardous waste are encouraged to develop long-term waste management programs. Large generators of hazardous waste should be encouraged to recycle, treat and detoxify their wastes on site. Many such processes could be implemented in existing industrial map designations, if zoned appropriately (Policy No. 17).
- Include consideration of fiscal impacts of development proposals, so that the character and extent of possible public service or facility deficiencies can be identified during the course of the normal project review process (Implementation B).
- Determine the local cost of facility and infrastructure improvements and expansion which are necessitated by new development of any type and prepare a schedule of charges to be levied on the developer at the time of approval of the Final Map (Implementation E).
- Ensure that the Superintendent of Schools and the respective school boards are informed of development proposals and are afforded the opportunity of evaluating their potential effect on the physical capacity of school facilities and their fiscal impact on locally originating revenue requirements. Their reports on these impacts should be available on a timely fashion prior to final consideration and action by Kern County on a development application (Implementation J).
- Roads and highways utilized for commercial shipping of hazardous waste destined for disposal will be designated as such pursuant to Vehicle Code Sections 31030 et seq. Permit applications shall identify the commercial



shipping routes they propose to utilize for particular waste streams (Implementation O).

#### **ENERGY ELEMENT OF THE KERN COUNTY GENERAL PLAN**

- The County shall encourage the development and upgrading of transmission lines and associated facilities (e.g., substations) as needed to serve Kern County's residents and access the County's generating resources, insofar as transmission lines do not create significant environmental or public health and safety hazards (Policy No. 1).
- The County shall review proposed transmission lines and their alignments for conformity with the Land Use Element of the Kern County General Plan (Policy No. 2).
- In reviewing proposals for new transmission lines and/or capacity, the County shall assert a preference for upgrade of existing lines and use of existing corridors where feasible (Policy No. 3).
- The County shall work with other agencies in establishing routes for proposed transmission lines (Policy No. 4).
- The County shall discourage the siting of above ground transmission lines in visually sensitive areas (Policy No. 5).
- The County should encourage new transmission lines to be sited/configured to avoid or minimize collision and electrocution hazards to raptors (Policy No. 6).
- The County should monitor the supply and demand of electrical transmission capacity locally and statewide (Implementation A).
- The County shall continue to maintain provisions in the Zoning Ordinance and update as necessary to provide for transmission line development (Implementation B).

#### **KERN COUNTY ZONING CODE**

The Kern County Zoning Ordinance was adopted in July 1997. The ordinance implements the Kern County General Plan by applying development standards and construction requirements on land as it is developed within the unincorporated areas of the county. The following sections of the Kern County Zoning Ordinance apply to the project: Section 19.80.30 of Chapter 19.80 (Special Development Standards – Commercial and Industrial Districts); Sections 19.82.030 and 19.82.090 of Chapter 19.82 (Offstreet Parking - Design and Development Standards); and Section 19.86.060 of Chapter 19.86 (Landscaping Standards – Industrial Uses). The following divisions of the Kern County Zoning Ordinance apply to the project.

## ***ZONING DISTRICTS***

### **EXCLUSIVE AGRICULTURE (A)**

Areas that are suitable for agricultural uses. This designation is designed to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to non-agricultural uses. Permitted uses in the “A” District are limited primarily to agriculture and other activities compatible with agriculture.

### **LIMITED AGRICULTURE (A-1)**

Areas that are suitable for a combination of estate-type residential development, agricultural uses, and other compatible uses.

### **ESTATE (E)**

Areas that are suitable for larger lot residential living environments. Uses are limited to those typical of and compatible with, quiet residential neighborhoods. Uses permitted in the Estate District include agricultural, residential, commercial utility, communication facilities, resource extraction and energy development uses.

### **LOW-DENSITY RESIDENTIAL (R1)**

Areas that are suitable for traditional smaller lot, single-family homes and compatible uses. Maximum density is limited to ten dwelling units per net acre.

### **MEDIUM INDUSTRIAL (M-2)**

Areas suitable for general manufacturing, processing and assembly activities and other compatible uses.

### **MOBILE HOME COMBINING (MH)**

Areas suitable for mobile homes and compatible uses.

### **GENERAL COMMERCIAL (C-2)**

Areas suitable for retail commercial activities including regional shopping, heavy commercial and compatible uses.

### **AIRPORT APPROACH HEIGHT COMBINING DISTRICT (H)**

The purpose of this District is to minimize aviation hazards by limiting the height of buildings, structures, and trees in approach zones around airports. The standards established by the H District shall be in addition to the regulations of the base district with which the H District is combined.

The following tables indicate the Kern County zoning designations of the proposed project and linear corridors.

In addition to the table, the following chapters of the Kern County Zoning Ordinance apply to the project: Section 19.80.30 of Chapter 19.80 (Special Development Standards – Commercial and Industrial Districts); Sections 19.82.030 and 19.82.090 of Chapter 19.82 (Offstreet Parking - Design and Development

Standards); and Section 19.86.060 of Chapter 19.86 (Landscaping Standards – Industrial Uses).

### **Zoning Designations Within The Affected Environment**

<b>Location or Linear Facility</b>	<b>Zoning Designations</b>
Elk Hills Power Plant	Location or Linear Facility
Transmission Line Route 1A	Limited Agriculture (A-1), Limited Agriculture (A-1), Estate (E-20, E-10), Low Density Residential Mobile Home (R1-M H), General Commercial (C-2)
Transmission Line Route 1B and 1B Variation	Limited Agriculture (A-1), Exclusive Agriculture (A), Airport Approach Height Combining (H)
Water Supply Line Route 2	Limited Agriculture (A-1), Exclusive Agriculture (A)
Wastewater Supply Line Route 3	Limited Agriculture (A-1), Exclusive Agriculture (A)
Natural Gas Supply Line Route 4	Limited Agriculture (A-1)

## **SETTING**

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The proposed project is located in western Kern County, about 25 miles west of Bakersfield, California. The site is located at the intersection of Elk Hills Road and Skyline Road and is characterized by sparse vegetation, and out-of-service tanks and related equipment formerly used for storage and loading of propane, butane, and natural gas liquid products. No permits are required from the Kern County Planning Department for demolition and removal of existing equipment. Please refer to Waste Management regarding demolition and removal of existing equipment from the site.

There are no residences, parks, recreational, educational, religious, health care facilities, or commercial uses on the site or within a five-mile radius of the site. The project is located within the administrative boundaries of the Elk Hills Oil and Gas Field (Division 1998). With the exception of Elk Hills Road, the entire 74 square mile Elk Hills Oil and Gas Field is closed to public access (EHPP 1999). EHPP proposes to lease a 12-acre portion of a 640-acre parcel of record (Assessor's Parcel Number 158-090-05) from Occidental of Elk Hills, Inc. (OEHI) for the project site. Please refer to the Project Description section for a map showing the regional location of the project.

## **TRANSMISSION LINES**

Transmission Line Route 1A passes through land zoned A-1, E-20, E-10, R1-MH, and C-2. Transmission Line Route 1B (and Route 1B Variation) pass through land zoned A-1, A, and A/H. Under the Kern County Zoning Ordinance, transmission lines are permitted by right in all zones, and require no discretionary permits from the county (Kern County Zoning Ordinance Section 19.08.090). The proposed routes for 1B and 1B Variation are slightly different. Route 1B is parallel to the existing Midway-Taft 115 kV line that runs between the EHPP power plant site and

the Midway substation. 1B Variation would replace the existing line and transmission structures (lattice towers and steel poles) with steel poles rather than adding more structures to the landscape. The existing land uses for linear facilities are represented in Land Use Table 2. Sensitive receptors along the corridor of Route 1A include a school (800 feet), a church, and residences (800 -1,200 feet). Please refer to the Transmission Line Safety and Nuisance section for a discussion of sensitive receptors near transmission lines.

## **IMPACTS**

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### **DIRECT IMPACTS**

#### ***DEPARTMENT OF CONSERVATION'S DIVISION OF OIL, GAS, AND GEOTHERMAL RESOURCES***

A March 18, 1999 letter from Department of Conservation's Division of Oil, Gas, and Geothermal Resources (Division) states that the proposed project is located within the administrative boundaries of the Elk Hills oil field. Review of the AFC by the Division determined that there are three production wells within proximity to the subject site and numerous plugged and abandoned, idle, producing, and injection wells near the project's proposed transmission line and water pipeline routes. The Environmental Protection Agency (EPA) will issue a Class I injection well permit for the project. Please refer to the Transmission Line Safety and Nuisance and Water Quality sections for a discussion of compliance with LORS, impacts and proposed mitigation in this area.

#### ***CONSTRUCTION OF POWER PLANT***

The project site is situated on land within the Elk Hills Oil and Gas Field and the land is used for oil and gas production facilities. With the exception of Elk Hills Road, the entire Elk Hills Oil and Gas Field is closed to public access. Therefore, construction of the proposed project would not result in a change in land use in the area. EHPP proposes to lease a 12-acre portion of a 640-acre parcel of record (Assessor's Parcel Number 158-090-05) from Occidental of Elk Hills, Inc. (OEHI). Therefore, certain requirements of the Subdivision Map Act apply to the project. Kern County has stated to EHPP that to fulfill the requirements of the Subdivision Map Act, EHPP file an application for a lot line adjustment, which is a Categorical Exemption under the California Environmental Quality Act (CEQA). EHPP will submit the application to Kern County in January 2000, after the lease is recorded.

The project site is designated Mineral and Petroleum in the Kern County General Plan. Based on policies in the Kern County General Plan, the project is compatible with the existing land use designation. The site is zoned "A-1" (Limited Agriculture). Power plants are a conditional use in this zone. Therefore, for the project to be consistent with the Kern County Zoning Ordinance, the project must comply with certain conditions of approval, set forth by the Kern County Planning Department, and specified under MITIGATION below.

## **CONSTRUCTION OF TRANSMISSION LINE ROUTES**

Fifty-four transmission poles will be used for Transmission Line Route 1A; 68 transmission poles will be used for Transmission Line Route 1B; and 66 transmission poles will be used for Transmission Line Route 1B Variation. Transmission Line Route 1A passes through land zoned A-1, E-20, E-10, R1-MH, and C-2. Transmission Line Route 1B (and Route 1B Variation) pass through land zoned A-1, A-1/H, A, and A/H. Under the Kern County Zoning Ordinance, transmission lines are permitted by right in all zones and require no discretionary permits from the county. As stated above, Transmission Line Route 1B passes through an area zoned A-1/H and A/H (Airport Approach Height Combining District). The purpose of this combining district is to minimize aviation hazards by limiting the height of trees and structures in approach zones around airports. Permitted uses in an H District are those uses permitted by the base district with which the H District is combined, in this case A-1 (Limited Agriculture) and A (Exclusive Agriculture).

Currently, there are three existing concrete transmission line poles (71 feet in height) and one existing lattice tower (105 feet in height) in the Airport Approach Height Combining District. All four existing structures will be removed and replaced with four concrete poles, between 100 and 130 feet in height. Because the replacement pole height is potentially greater than the tallest existing lattice height, EHPP is required to seek approval from Federal Aviation Administration (FAA) for Federal Air Regulations Part 77 for replacement of the structures. EHPP will also submit a letter from FAA to Kern County which states that the proposed development does not constitute a hazard to air traffic and does not violate any federal regulations. The letter shall include any special conditions imposed by FAA. In addition to the letter, EHPP will submit to Kern County a site development plan indicating among other requirements, the elevations of all permanent structures. At this time, Energy Commission staff has not received confirmation from FAA or Kern County regarding compliance with Regulation 77.

## **AGRICULTURAL RESOURCES**

Information contained in the AFC states that Transmission Line Route 1A will not cross agricultural lands. This route is entirely within the Elk Hills Oil and Gas Field, and the area is used for oil and gas extraction. The last segment of Transmission Line Route 1B (about 3.5 miles) is within an existing transmission right-of-way (the undeveloped shoulder of Wasco Way) and adjacent to agricultural lands. The total number of acres taken out of production due to construction of the route is 0.01. This land is considered Prime agricultural land as defined by the California Department of Conservation (EHPP 1999). No other agricultural lands affected by construction of the transmission line routes are considered Prime, Unique, or Farmland of Statewide Importance as defined by the California Department of Conservation (EHPP 1999). As stated above, transmission lines in the A and A-1 districts are permitted by right, and require no discretionary permits from the county. Therefore, because of the minimal amount of agricultural land affected by the construction of the transmission line routes, Energy Commission staff does not consider this an adverse or significant impact to agricultural use.

## **CUMULATIVE IMPACTS**

In general, Energy Commission staff considers conversion of agricultural lands to non-agricultural uses, and changes in land use patterns to be significant cumulative impacts.

The project is located within the administrative boundaries of the Elk Hills Oil and Gas Field (Division 1998). With the exception of Elk Hills Road, the entire 74 square mile Elk Hills Oil and Gas Field is closed to public access (EHPP 1999). Numerous petroleum recovery and storage facilities, electric and petroleum transmission facilities, and access roads characterize the project area. In general, existing land use in western Kern County is characterized by oil fields and natural resource development, with land designated and zoned for agricultural use, grazing, resource extraction, and energy development uses. In addition to the proposed project, other regional projects include La Paloma and Sunrise. Because La Paloma and Elk Hills are located within existing oil fields, no conversion of agricultural lands or changes in land use patterns are expected to occur as a result of project construction and operation. In addition, staff considers Route 1B Variation to be environmentally superior to Route 1B because it would replace existing towers with poles and reduce the number of transmission structures in the landscape. For these reasons, Energy Commission staff finds that the La Paloma, Sunrise, and Elk Hills projects will not have a significant adverse cumulative impact on land use in western Kern County.

## **CONSISTENCY WITH LAND USE PLANS, POLICIES, AND REGULATIONS**

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The project site is designated Mineral Petroleum in the Kern County General Plan. Based on policies in the Kern County General Plan, the project is compatible with this land use designation. The site is zoned Limited Agriculture (A-1). The proposed transmission line route will traverse lands zoned Exclusive Agriculture and Limited Agriculture. The Kern County Zoning Ordinance states that transmission lines, resource extraction, and energy development uses in these zones are permitted by right, and require no discretionary permits from the county. However, power plants are a conditional use in this zone. Therefore, to satisfy certain provisions of Chapters 19.12, 19.86, and 19.82 of the Kern County Zoning Ordinance, Energy Commission staff has required EHPP to prepare a site development plan that includes provisions to satisfy the following requirements of the Kern County Zoning Ordinance (please refer to MITIGATION, below).

In addition, EHPP proposes to lease a 12-acre portion of a 640-acre parcel of record (Assessor's Parcel Number 158-090-05) from Occidental of Elk Hills, Inc. (OEHI). Therefore, certain requirements of the Subdivision Map Act apply to the project. Kern County has stated to EHPP that to fulfill the requirements of the Subdivision Map Act and the Kern County Land Division Ordinance, EHPP file an application for a lot line adjustment, which is a Categorical Exemption under the California Environmental Quality Act (CEQA).

As stated above, EHPP is required to seek approval from FAA for Federal Air Regulations Part 77 for replacement of the existing poles and lattice tower in the Airport Approach Height Combining District. At this time, Energy Commission staff has not received confirmation from EHPP regarding compliance with FAA Regulations Part 77.

Energy Commission staff finds that with eventual approval of the lot line adjustment, compliance with FAA Regulations Part 77, and proposed condition of certification **LAND-1**, EHPP will comply with all federal, state, and local applicable laws, ordinances, regulations, standards, plans and policies. As stated above, EHPP currently has not filed for a lot line adjustment with Kern County. EHPP has filed with the FAA but the status of that application is unknown to Energy Commission staff at this time.

## **FACILITY CLOSURE**

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### **PLANNED CLOSURE**

Planned closure occurs at the end of a project's life, when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence. Facility closure would have to comply with all applicable policies in the Kern County General Plan and ordinances in effect at the time of closure.

### **UNEXPECTED TEMPORARY CLOSURE**

This unplanned closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster, or an emergency.

### **UNEXPECTED PERMANENT CLOSURE**

This unplanned closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned.

In February 1997, the Compliance Office of the Energy Commission conducted a Plant Closure Survey. The survey was sent to various local and state agencies to determine whether these agencies had any regulations or compliance procedures regarding the closure of power plants and other large industrial facilities. At that time, Kern County responded that they had no requirements for a closure plan and no requirements for site restoration. At present, Kern County has no specific requirements regarding closure and site restoration. However, they have requested that any closure plans required by the Energy Commission be subject to an advisory review by Kern County. In that way, Kern County could provide site/project specific comments at that time (Rickels 1999).

## MITIGATION

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EHPP has proposed four mitigation measures that they will implement for the proposed project to avoid or minimize land use impacts associated with the construction and operation of the generating plant, transmission line route, and offsite pipeline facilities. Staff has incorporated EHPP's four mitigation measures (listed below) into the proposed conditions of certification as **LAND-1**. These conditions will be part of the site development plan that EHPP submits to the Kern County Planning Department.

- Comply with regulatory agency permits and requirements concerning land use issues.
- Develop small-scale construction scheduling where appropriate to avoid conflicts with agricultural operations.
- Where applicable, place tower structures to minimize direct adverse effects on agricultural areas (including row and/or field crops) and other important land use features. Time construction activities to avoid impacts to cultivated areas to the extent practical.
- If agricultural facilities (e.g. irrigation systems, fences, and gates) are damaged, repair or replace these facilities.

Kern County normally would require a conditional use permit for this type of project. However, local agency requirements are superseded by Energy Commission action on certification. Therefore, staff has required EHPP to prepare a development plan that complies with Kern County's zoning conditions of approval (**LAND-1**). Kern County's zoning conditions of approval are stated below. Energy Commission staff (Land Use, Water and Soils, Worker Safety, Public Health, Air Quality, Visual, Facility Design) have analyzed the project's need to comply with the following conditions for LORS compliance. Energy Commission staff whose technical areas are affected by the conditions are indicated in parentheses (). LORS compliance is indicated in those technical sections and cross-referenced to the Land Use section.

1. Prior to the issuance of any building or grading permits, the method of water supply and sewage disposal shall be as required by the Kern County Environmental Health Services Department (Water, Public Health).
2. Fire protection equipment, access and fire protection facilities shall be as required by the Kern County Fire Department (Worker Safety, Facility Design).
3. Prior to the issuance of any building or grading permits, a plan for the disposal of drainage waters originating on site and from adjacent road rights-of-way shall be reviewed by the Kern County Engineering and Survey Services Department/Floodplain Management Section, if required and commented on. Easements or grant deeds shall be given to the County of Kern for drainage purposes or access thereto, as necessary (Facility Design).
4. The development shall comply with any requirements of the San Joaquin Valley Unified Air Pollution Control District (Air Quality).



5. The applicant shall comply with requirements of the Subdivision Map Act and Kern County Land Division Ordinance (Land Use).
6. The property owner shall record an irrevocable offer of dedication of road right-of-way to the County of Kern of all subject property within 30 feet of the centerline of Elk Hills Road, including a 20 foot by 20 foot corner cutoff at intersecting streets, for local street alignment purposes. Prior to recordation, said offer of dedication shall be reviewed by the Rights-of-Way Section of the Kern County Roads Department (Land Use).
7. All water storage and pressure tanks shall be painted an earthen hue color (Visual Resources).
8. A minimum of 13 on-site parking spaces shall be provided (Land Use).
9. All vehicle parking and maneuvering areas and access roads shall be surfaced with a minimum of two inches of Asphalt Concrete paving or material of higher quality (Land Use).
10. All vehicle parking and maneuvering areas shall be surfaced with one of the following: three inches of decomposed granite, three inches of compacted rock dust, three inches of gravel, or three inches of a material of a higher quality (Land Use).
11. Vehicle parking spaces shall be 9 feet by 20 feet or larger in size and shall be designated by white painted stripes, except as provided in Sections 19.82.030 and 19.82.040 of the Zoning Ordinance (Land Use).
12. Parking lot or site illumination shall be directed away from adjoining properties and public roads (Visual Resources).
13. A comprehensive landscaping and maintenance irrigation plan shall be approved by the Planning Director in accordance with the requirements of Chapter 19.86 of the Zoning Ordinance. A minimum of five percent of the total developed area shall be landscaped and continuously maintained in good condition. If the required parking area contains more than ten spaces, a minimum of 5 percent of the interior parking area shall be landscaped, with trees planted at a ratio of one tree per ten spaces. Parking area landscaping, if necessary, shall be in accordance with Section 19.82.090 of the Zoning Ordinance and may be used in the calculation of total landscaping requirements. Landscaping shall be installed or bonded for prior to occupancy of the building or site (Land Use).
14. During all on-site grading and construction activities, adequate measures shall be implemented to control fugitive dust (Air Quality).
15. All trash receptacles shall be screened in such a manner so that they are not visually obtrusive from any off-site location (Visual Resources).
16. The areas devoted to outside storage shall be treated with a dust binder or other dust control measure, as approved by the Director of the Kern County Planning Department. Screening, if required by the base district regulations, shall also be provided (Land Use).

17. All signs shall be approved by the Director of the Kern County Planning Department prior to installation (Visual Resources).

## CONCLUSION AND RECOMMENDATION

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Energy Commission staff's analysis indicates that the project by itself, and cumulatively, will have no land use impacts that cannot be mitigated to a level below significance. If staff's conditions of certification are implemented, the project will comply with all applicable laws, ordinances, regulations, standards, plans and policies. If the Commission certifies the proposed project, staff recommends that it adopt the following condition of certification.

## PROPOSED CONDITIONS OF CERTIFICATION

**LAND-1** Prior to the start of construction, the project owner shall submit a site development plan for the project to Kern County for their review and comment, and to the California Energy Commission Compliance Project Manager (CPM) for review and approval. The site development plan shall comply with all applicable provisions of Chapters 9.12, 19.86, and 19.82 of the Kern County Zoning Ordinance. The project owner shall provide a letter of comment from the Kern County Planning Director stating that the project is consistent with the provisions of the Kern County General Plan and Zoning Ordinance.

Protocol: The project owner shall submit to the CPM for review and approval a site development plan, including a landscaping plan. The project owner shall submit a letter from the Kern County Planning Director stating that the site development plan conforms to Kern County's Zoning Code and has been approved by the County. If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall prepare and submit to the CPM a revised plan. The landscaping shall not be planted before the plan is approved. The project owner shall notify the CPM when the landscaping has been planted and is ready for inspection.

Verification: At least 60 days prior to the start of any ground disturbance related to construction, the project owner shall submit the proposed site development plan and landscape plan and a copy of the letter of comment from the Kern County Planning Director to the CPM for review and approval. The project owner shall submit any required revisions within 30 days of notification by the CPM. The project owner shall complete installation of the landscaping by the end of the first planting season following first electricity generation. The project owner shall notify the CPM within seven days after the landscaping is planted that the landscaping is ready for inspection.

## REFERENCES

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# TRAFFIC AND TRANSPORTATION

Testimony of Eric Knight and Rick Tyler

## INTRODUCTION

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The Traffic and Transportation section of the Final Staff Assessment (FSA) addresses the extent to which the Elk Hills Power Project (EHPP) may impact the transportation system within the vicinity of its proposed location. The analysis identifies the regional and local traffic and transportation setting for the proposed project, the anticipated transportation impacts resulting from the project and their likely significance, proposed and recommended mitigation measures to eliminate or reduce those impacts, and measures to monitor the compliance and effectiveness of those mitigation measures.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS

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### FEDERAL

The federal government addresses transportation of goods and materials in Title 49, Code of Federal Regulations:

- Title 49, Code of Federal Regulations, sections 171-177, governs the transportation of hazardous materials, the types of materials defined as hazardous, and the marking of the transportation vehicles.
- Title 49, Code of Federal Regulations, sections 350-399, and Appendices A-G, Federal Motor Carrier Regulations, addresses safety considerations for the transport of goods, materials and substances over public highways.

### STATE

The California Vehicle Code and the Streets and Highways Code contain requirements applicable to the licensing of drivers and vehicles, the transportation of hazardous materials and right-of-way. In addition, the California Health and Safety Code addresses the transportation of hazardous materials. Specifically, these codes include:

- California Vehicle Code, section 353 defines hazardous materials.
- California Vehicle Code, sections 31303-31309, regulates the highway transportation of hazardous materials, the routes used, and restrictions thereon.
- California Vehicle Code, section 31030, requires that permit applications shall identify the commercial shipping routes they propose to utilize for particular waste streams.
- California Vehicle Code, sections 31600-31620, regulates the transportation of explosive materials.
- California Vehicle Code, sections 32000-32053, regulates the licensing of carriers of hazardous materials and includes noticing requirements.

- California Vehicle Code, sections 32100-32109, establishes special requirements for the transportation of inhalation hazards and poisonous gases.
- California Vehicle Code, sections 34000-34121, establishes special requirements for the transportation of flammable and combustible liquids over public roads and highways.
- California Vehicle Code, sections 34500, 34501, 34501.2, 34501.4, 34501.10, 34505.5-7, 34507.5 and 34510-11, regulate the safe operation of vehicles, including those which are used for the transportation of hazardous materials.
- California Vehicle Code, sections 2500-2505, authorize the issuance of licenses by the Commissioner of the California Highway Patrol for the transportation of hazardous materials including explosives.
- California Vehicle Code, sections 13369, 15275, and 15278, address the licensing of drivers and the classifications of licenses required for the operation of particular types of vehicles. In addition, it requires the possession of certificates permitting the operation of vehicles transporting hazardous materials.
- California Streets and Highways Code, sections 117 and 660-72, and California Vehicle Code 35780 et seq., require permits for the transportation of oversized loads on county roads.
- California Streets and Highways Code, sections 660, 670, 1450, 1460 et seq., 1470, and 1480, regulate right-of-way encroachment and the granting of permits for the encroachment on state and county roads.
- California Health and Safety Code, sections 25160 et seq., address the safe transport of hazardous materials.

## **LOCAL**

### ***KERN COUNTY***

The Circulation Element of the Kern County General Plan sets up local goals and guiding policies about building transportation improvements. It introduces planning tools essential for achieving the local transportation goals and policies (Kern County, 1992). Relevant goals and policies include, in part, the following:

#### **PRIVATE DEVELOPMENT ACCESS TO EXISTING ROADWAY NETWORK**

As a condition of private development approval, developers shall build roads needed to access the existing road network. Developers shall build these roads to County standards (Policy No. 1).

#### **GROWTH BEYOND 2010**

The County should monitor traffic volumes and patterns on County major highways (Policy No. 1).

Development applications must demonstrate that sufficient transportation capacity is available to serve the proposed project at Level of Service “D” (LOS D) or better (Policy No. 2).

#### **TRUCKS ON HIGHWAYS**

Make the California Department of Transportation (Caltrans) aware of heavy truck activity on Kern County’s roads (Policy No. 1).

Start a program that monitors truck traffic operations (Policy No. 2).

Promote a monitoring program of truck lane pavement condition (Policy No. 3).

#### **TRUCK ROUTES**

The County’s Transportation Management Department should oversee truck travel patterns and be aware of locations where heavy trucks traverse residential areas (Policy No. 1).

#### **TRANSPORTATION OF HAZARDOUS MATERIALS**

State maintained highways are acceptable as commercial hazardous waste transportation routes (Policy No. 1).

Kern County and affected cities should reduce use of County maintained roads and city maintained streets for transportation of hazardous materials (Policy No. 3).

Restrict commercial transportation of hazardous materials in accordance with Vehicle Code section 31303. The Circulation Element charts routes where commercial hazardous materials shipments can go (Policy No. 4).

#### **DAMAGED ROAD PAVEMENT**

The County shall continue to maintain pavement conditions and check operating conditions by collection and review of traffic flow and accident data to rate the circulation system (Policy No. 1).

## **SETTING**

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### **REGIONAL DESCRIPTION**

#### ***FREEWAYS AND HIGHWAYS***

The project site is located about 25 miles west of Bakersfield, California, and about 10 miles north of the community of Taft. The project area is primarily served by Interstate 5 and State Route (SR) 99, which are four-lane divided highways (oriented north/south); and State Routes 119, 58 and 166, that are two-lane highways (oriented east/west). Please refer to TRAFFIC AND TRANSPORTATION Figure 1.

## **RAILROADS**

The Burlington-Northern & Santa Fe (BN&SF) and Union Pacific Railroads provide rail service to the Bakersfield area. There are four rail line corridors within the region surrounding the project: the BN&SF Railroad main line; the Southern Pacific main line (Union Pacific); the Southern Pacific Buttonwillow Branch line (Union Pacific); and the BN&SF Sunset Pacific Branch line currently operated by Union Pacific (EHPP 1999a, page 5.11-6). Please refer to TRAFFIC AND TRANSPORTATION Figure 1.

## **SITE AND VICINITY DESCRIPTION**

The power plant site is adjacent to Elk Hills Road, a two-lane local road maintained by Kern County that runs north/south through the Elk Hills Oil and Gas Field. Access to the site will be provided through two entrances (EHPP 1999j). The primary entrance to the facility will be a new asphalt-paved road that will branch off Skyline Road (a private road that serves the Elk Hills Oil and Gas Field) west of the intersection of Elk Hills Road and Skyline Road. This entrance will be through an existing gate controlled by Occidental of Elk Hills, Inc. (OEHI) and be utilized by normal traffic to and from the site. During project construction, a temporary, 40-foot wide, 135-foot long access road extending from Elk Hills Road about 600 feet north of Skyline Road will be used to receive heavy and/or over-sized equipment and materials only. A 20-foot wide loop road, consisting of two 10-foot asphalt-paved lanes will provide internal circulation. The plant's administration building parking lot and road encircling the power blocks will also be asphalt paved. Other roads within the plant site will be surfaced with gravel (EHPP 1999a, page 3-51; 5.11-6; and 5.11-10).

## **LINEAR FACILITIES**

Potentially affected roadways are those adjacent to or crossed by the proposed project linear components (i.e., transmission line, natural gas pipeline, and water supply and wastewater pipelines).

### **TRANSMISSION LINE ROUTE 1A**

Transmission line alternative Route 1A has a total length of 9.0 miles. Route 1A originates at the power plant switchyard and extends 0.2 miles northwest to intercept the route of the PG&E 115 kV Midway-Taft transmission line. Route 1A will parallel the Midway-Taft line for 1.8 miles. This segment of Route 1A crosses Elk Hills Road. Route 1A then heads 7 miles to the east towards the town of Tupman, running along dirt roads within the Elk Hills Oil and Gas Field. Near the terminus of this segment, Route 1A crosses Tupman Road. Along this segment of Route 1A, spur roads will be constructed from existing oil field roads to provide access to the transmission line. These spur roads will be kept to a minimum (EHPP 1999, page 3-53).



**TRAFFIC AND TRANSPORTATION Figure 1**  
**Regional Transportation Setting**

#### **TRANSMISSION LINE ROUTE 1B (AND ROUTE 1B VARIATION)**

Transmission line alternative Route 1B has a total length of 8.6 miles. From the plant switchyard to milepost 2.0 (see the applicant's Application for Certification [AFC] Figure 3.2-1), Route 1B follows the same routing as alternative Route 1A. Route 1B would then extend 2.3 miles north-northwest, running parallel to the Midway-Taft transmission line. Spurs from existing oil field roads will provide access to the transmission line along this segment of Route 1B. Route 1B then extends 4.3 miles north to the Midway substation, continuing parallel to the Midway-Taft line and running along the eastern side of Wasco Way within the road right-of-way (EHPP 1999, page 3-59). A variation on Route 1B would replace the Midway-Taft line from milepost (MP) 4.3 to MP 8.6 and be located on the western side of Wasco Way (EHPP 1999c, data response #42). Roadways crossed by Route 1B include Elk Hills Road, Stockdale Highway (a county road), Bright Road and SR 58.

#### **NATURAL GAS PIPELINE**

Natural gas will be delivered to the power plant site via a new 2,500-foot underground pipeline. The route of the new supply pipeline lies entirely within the Elk Hills Oil and Gas Field and would cross two oil field access roads (EHPP 1999a, page 3-65 and 5.11-10).

#### **WATER SUPPLY PIPELINE**

Water for the EHPP will be delivered via a new 9.8-mile water supply pipeline extending from the West Kern Water District (WKWD) facilities located east of the power plant site and adjacent to SR 119. The water supply pipeline will begin as an underground pipeline, travelling alongside existing underground pipelines for 4.1 miles. For the remaining 5.7 miles to the plant site, the pipeline will be constructed above ground but will pass underground at any road crossings. Along its route the water supply pipeline will cross a number of oil service roads, Tupman Road, Elk Hills Road, and SR 119. The crossings at SR 119, Tupman Road, and Elk Hills Road will be constructed by drilling underneath these roadways (EHPP 1999a, page 3-65 and 5.11-9).

#### **WASTEWATER PIPELINE**

Wastewater discharge for the EHPP will be sent via a new 4.4-mile pipeline to new disposal wells south of the power plant site. The wastewater pipeline will be constructed above ground but will pass underneath Elk Hills Road, Skyline Road and other oil field access roads. After crossing Skyline Road, the pipeline will travel south to the disposal wells alongside an existing aboveground pipeline and generally parallel to Elk Hills Road (EHPP 1999a, page 3-66 and 5.11-10).

### **EXISTING TRAFFIC CONDITIONS**

When assessing a project's potential impact on the local transportation system, levels of service measurements are the foundation for analytic evaluations. Essentially, levels of service (LOS) measurements represent the flow of traffic. In general, LOS ranges from A, free flowing traffic, to F, which is heavily congested

with stoppage of the flow. A threshold of LOS D is the minimum standard accepted by both Caltrans and Kern County.

Data pertaining to the existing traffic characteristics on highways potentially affected by the proposed project are presented in TRAFFIC AND TRANSPORTATION Table 1. This information includes annual average daily traffic (AADT), peak hour traffic, average daily truck traffic, highway capacity, and LOS. Highways potentially affected by the project are currently operating at acceptable levels of service. The highways serving the project area are characterized by a significant amount of truck traffic due to local agricultural and oil-related industries (EHPP 1999a, page 5.11-7). As shown in Table 1, truck traffic on SR 119, the principal highway serving the EHPP site, ranges from 19 to 22 percent.

The AFC provides accident data from a 1998 Caltrans report, which shows that highways in the project area have accident rates that typically range from 0.26 to 5.03 accidents per million vehicle miles traveled. Statewide average accident rates for similar transportation facilities range from a low of 0.71 for freeways to a high of 2.27 for conventional multi-lane facilities. Roadway segments with accident rates higher than statewide averages include the SR 119 junction with SR 99 (4.11) and the SR 43 junction with SR 58 (2.90) (EHPP 1999a, page 5.11-9). In a data request to the applicant, staff requested clarification for the accident rate provided for the SR 43/58 junction since SR 58 joins SR 43 at two locations (please refer to TRAFFIC AND TRANSPORTATION Figure 2). The 2.90 accident rate actually applies to a 0.6-mile segment of SR 43, north of the intersection with I-5. The accident rates for the intersections of SR 43 and SR 58 are 0.7 at the north intersection and 0.55 at the south intersection (EHPP 1999f, data response #78).

Data pertaining to existing traffic conditions on Elk Hills Road and other local roadways potentially affected by the project are presented in TRAFFIC AND TRANSPORTATION Table 2. The information includes AADT, capacity, and LOS. Since LOS data was not available from Kern County, it was calculated by dividing the volume of traffic (AADT) by the capacity of the roadway, a standard acceptable practice as presented in the Kern County General Plan Circulation Element. As determined by the volume to capacity ratio (V/C), LOS on local roadways serving the project site is characterized by free flowing (LOS A) operating conditions. Truck traffic counts on local roadways also is not available from Kern County. Traffic in the project vicinity is generally characterized by a large ratio of trucks to cars because the EHPP site is located within the Elk Hills Oil and Gas Field. It is assumed that 20 to 40 percent of traffic along Elk Hills Road are trucks (EHPP 1999, page 5.11-7). Kern County Roads Department agreed that this estimate is accurate (Hayslett 1999a, pers. comm.).

**TRAFFIC AND TRANSPORTATION Table 1**  
**Existing Traffic Characteristics on Highways in the Project Area**

Highway/ Mile Post	Location	Annual Average Daily Traffic <sup>1</sup>	Peak Hour Traffic <sup>1</sup>	Annual Average Daily Truck Traffic <sup>2</sup>	Percent of Truck Traffic <sup>3</sup>	Highway Capacity <sup>4</sup>	LOS <sup>1</sup>
<b>State Rte. 33</b>							
17.89	Jct. Rte. 119 East	8,500	830	2,210	26	1,410	D
33.45	Jct. Rte. 58 West	2,700	410	1,061	39	1,380	C
34.29	Jct. Rte. 58 East	2,700	440	1,061 <sup>5</sup>	39	1,380	C
<b>State Rte. 58</b>							
31.46	SB I-5 Ramp	5,300	750	1,705 <sup>5</sup>	32	1,680	B
39.96	Jct. Rte. 43 North	5,500	560	1,705	31	1,710	B
<b>State Rte. 119</b>							
0.00	Jct. Rte. 33	3,750	480	712	19	3,720	D
18.17	Jct. Rte. 43 North	8,400	1,050	1,848	22	1,860	B
19.77	Jct. I-5	5,800	700	1,102	19	1,860	B
31.28	Jct. Rte. 99	9,900	960	2,178	22	1,860	D
<b>Interstate 5</b>							
38.79	Jct. Rte. 119	22,400	3,350	4,256	19	3,560	B
41.19	Jct. Rte. 43	22,500	2,850	4,725	21	3,560	B
52.15	Jct. Rte. 58	23,500	2,750	7,520	32	3,560	B
<b>State Rte. 43</b>							
0.11	Jct. Rte. 119	3,800	420	1,102	29	1,700	B
1.90	Jct. I-5	3,800	420	1,102	29	1,700	B
8.11	Jct. Rte. 58 East	3,100	340	899	29	1,740	B
9.16	Jct. Rte. 58 West	9,600	1,150	2,688 <sup>5</sup>	28	1,740	B
<b>State Route 99</b>							
17.50	Jct. Rte. 119 West	32,500	3,050	8,125	25	3,560	B
23.51	Jct. Rte. 58 East	99,000	9,300	25,760	26	3,520	B
25.65	Jct. Rte. 58 West	112,000	11,600	25,760	23	3,520	B

SOURCE: EHPP 1999a, Table 5.11-2

<sup>1</sup> Source: 1996 Traffic Volumes on the California State Highway System (Caltrans 1998).

<sup>2</sup> Source: 1996 Truck Volumes on the California State Highway System (Caltrans 1998).

<sup>3</sup> Source: Percentages calculated using average daily truck traffic as a percentage of AADT.

<sup>4</sup> Vehicles per hour per direction. Source: 1996 Traffic Volumes on the California State Highway System (Caltrans 1998).

<sup>5</sup> Data not available from Caltrans. Extrapolated from data on adjacent highway segments.

**TRAFFIC AND TRANSPORTATION Table 2**  
**Existing Traffic Characteristics on Local Roads in the Project Area**

Roadway	Location	Annual Average Daily Traffic <sup>1</sup>	Annual Peak Hour Traffic <sup>2</sup>	Capacity (C)	LOS <sup>3</sup> (V/C)
Elk Hills Road	North of SR 119	740	74	8,000	A
Elk Hills Road	South of Skyline Road	900	90	8,000	A
Tupman Road	Northeast of SR 119	360	36	8,000	A
Wasco Way	South of SR 58	1,000	100	8,000	A
Valley West Road	East of Elk Hills Road	500	50	8,000	A

SOURCE: EHPP 1999a, Table 5.11-3.

<sup>1</sup> Source: Kern County Roads Department, 1999.

<sup>2</sup> Based on 10 percent of AADT.

<sup>3</sup> LOS calculated by dividing volume (V) by capacity (C); and using the V/C ratio.

## IMPACTS

According to Appendix G of the California Environmental Quality Act (CEQA), a project may have a significant effect on traffic and transportation if the project will:

- Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).
- Exceed, either individually or cumulatively, a level of service standard established for roads or highways.
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections).
- Result in inadequate parking capacity.

## POWER PLANT

### **CONSTRUCTION PHASE**

#### COMMUTE TRAFFIC

Construction of the EHPP will occur over an estimated 15-month period and will require a total construction workforce of 242 workers on average per month, assuming a single shift and a 40-hour workweek. During the peak construction period (the 8th month in the construction schedule), an estimated 350 construction workers will be required for the project (EHPP 1999a, page 5.11-11 and Table 5.8-5). The traffic analysis presented in the AFC assumes a worst-case scenario of each construction worker driving a separate vehicle to the project site, making two

trips per day (one round trip from home to the site and back). Therefore, construction of the EHPP could result in a total of approximately 480 vehicle trips per day on average, and about 700 vehicle trips per day during peak construction (EHPP 1999a, page 5.11-16).

From statistics on the distribution of labor and population within Kern County, the AFC makes assumptions about the origins of construction workforce commute trips (EHPP 1999a, page 5.11-16). TRAFFIC AND TRANSPORTATION Table 3 presents vehicle trip generation and the distribution of workers commuting to and from the EHPP site from the various cities and towns in Kern County. As shown in the table, nearly two-thirds of the commute traffic is expected to originate in Bakersfield.

**TRAFFIC AND TRANSPORTATION Table 3**  
**EHPP Construction Vehicle Trip Generation and Distribution**

<b>Origin of Trip Distribution To/From EHPP Site</b>	<b>Average Workforce</b>	<b>Average Vehicle Trips</b>	<b>Peak Workforce</b>	<b>Peak Vehicle Trips</b>
Bakersfield	152	304	221	442
Taft/Ford/Maricopa	13	26	20	40
Shafter/Wasco	11	22	15	30
Other Areas of Kern County/Southern California	66	132	96	192
<b>TOTAL</b>	<b>242</b>	<b>484</b>	<b>352</b>	<b>704</b>

SOURCE: EHPP 1999f, data response #63-65

The AFC also makes assumptions about preferred travel routes for construction workers commuting to the project site (EHPP 1999a, pages 5.11-16 – 17). For instance, it is assumed that workers commuting from Bakersfield will primarily travel on SR 99 to SR 119 to Elk Hills Road. Using these travel patterns, the increase in traffic on highways in the project area during construction is presented in TRAFFIC AND TRANSPORTATION Table 4 and illustrated in TRAFFIC AND TRANSPORTATION Figure 2. As shown in Table 4, except for one section of SR 119, daily and peak hour LOS for highways in the project area is not expected to be significantly affected as a result of construction workers commuting to and from the project site. The traffic analysis provided by the applicant determined that construction traffic would significantly impact the SR 119 junction with SR 43, which would drop from LOS D to E during the peak hour. To mitigate this impact, the applicant stated that carpooling by approximately 55 percent of workers would be necessary during the peak construction period, and that this level of carpooling is reasonable for projects such as EHPP (EHPP 1999f, data response #71).

Staff requested that Caltrans review the traffic analysis for the EHPP to assist staff in determining the most appropriate measure to mitigate the adverse impact to the SR 119/SR 43 junction. On October 20, 1999, staff received a letter from Caltrans which states their disagreement with the applicant's conclusion that it is reasonable

**TRAFFIC AND TRANSPORTATION Table 4**  
**Distribution of Construction Workforce Traffic on Highways**

**TRAFFIC AND TRANSPORTATION Figure 2**  
**Distribution of Construction Workforce Traffic on Highways and Local Roads**



to expect 55 percent of the construction workers to carpool, and that this level of carpooling would be difficult to monitor and ensure (Caltrans, 1999a). The Kern Council of Governments also expressed doubts about this level of carpooling, stating in a letter to Energy Commission staff that “without a concerted effort and employee inducements, a 50 percent carpool usage would appear to be unrealistic” (Kern COG, 1999).

After further consultation with Caltrans staff, it was determined that the traffic data provided by the applicant for SR 119 at SR 43 and SR 119 at SR 99 was not based upon the most recent traffic counts. The peak hour traffic counts provided by the applicant for existing conditions at the SR 119/43 junction were higher than the actual measured counts taken by Caltrans in July 1997 (Barnes, pers. comm., 1999). Using the most recent traffic data, peak hour LOS at the SR 119/43 junction will not be significantly affected by the project during the peak construction period. Since LOS will remain at its current LOS D, Caltrans will not require any mitigation at the SR 119/43 junction (Caltrans, 1999b). However, because peak hour traffic counts provided by the applicant for the SR 119/99 junction were lower than the actual measured counts, it was determined that the project will have a significant impact on the SR 119/99 junction during the construction period. The project will cause LOS at the SR 119/99 junction to drop from D to E during the peak hour.

According to Caltrans, a traffic signal is already planned and funded for the SR 119/99 junction, and therefore Caltrans would not require Elk Hills to fund improvements at this junction (Caltrans, 1999b). However, it is not known when the signal will be constructed. If the traffic signal is not in place prior to the start of construction of the EHPP, Caltrans recommends that the applicant provides traffic control at the SR 119/99 junction through the use of a police officer/flagman. The use of a policeman/flagman will require that the project owner submit a Traffic Control Plan to Caltrans prior to issuance of a permit. Staff agrees that this is the most appropriate mitigation measure to mitigate the temporary impacts to this junction and has proposed a condition of certification requiring the provision of traffic control at the SR 119/99 junction.

Traffic increases during the construction period to roadway segments with accident rates higher than the statewide average would be minimal. At the junction of SR 119 with SR 99, traffic would increase by 354 vehicles (3.6 percent of AADT) during the peak construction period. At the junction of SR 43 with SR 58, traffic would increase by 38 vehicles (1.2 percent of AADT) during peak construction.

The impact of construction-related traffic on the local roads that provide access to the project site is presented in TRAFFIC AND TRANSPORTATION Table 5, as well as illustrated in TRAFFIC AND TRANSPORTATION Figure 2. As shown in Table 5, Elk Hills Road will be the most heavily affected local road, with a 64 percent increase in vehicle trips per day north of SR 119 during the peak construction period. As shown in Table 2, Elk Hills Road and the other local roads potentially affected by the project have a design capacity of 8,000 vehicles per day.

**TRAFFIC AND TRANSPORTATION Table 5**  
**Distribution of Construction Workforce Traffic on Local Roads**

Because existing average daily traffic is minimal (360 to 1,000 average daily trips), these roads will be able to accommodate the increased traffic without reducing their LOS to a significant adverse level (i.e., LOS E or F).

In the Preliminary Staff Assessment (PSA), staff determined that the site access road proposed in the AFC had the potential to cause a significant traffic and transportation impact because its location could create a traffic hazard on Elk Hills Road. According to Barry Hayslett with Kern County Roads Department, the location of the AFC proposed access road (about 1,100 feet north of the intersection of Elk Hills Road and Skyline Road) would not be acceptable because it would be in close proximity to the crest of the hill and would not provide safe and adequate site distance (Hayslett 1999a, pers. comm.). This issue is of particular concern to staff because truck traffic on Elk Hills Road has been estimated as high as 40 percent, and operation of the power plant will require 1 truck delivery of anhydrous ammonia (8,000 gallons) every three weeks. To provide safe access to the site during both construction and operation of the project, Mr. Hayslett suggested that the applicant use the existing access road at Skyline Road, which has already been widened and channelized.

On November 22, 1999, the applicant submitted a proposal that would provide two entrances to the power plant site (EHPP 1999j). The primary entrance to the facility will be the intersection of Skyline Road and Elk Hills Road and will be utilized by normal traffic to and from the site. A temporary access road, located about 600 feet north of the intersection of Skyline Road and Elk Hills Road, will be used only to receive heavy and/or over-sized equipment and materials during construction of the project. To ensure adequate safety for motorists on Elk Hills Road, the applicant will post signs north and south of the temporary access road during deliveries of heavy and/or oversized equipment and materials (EHPP 1999j). In addition to signs, the applicant will post flagmen on Elk Hills Road to help reduce the speed of motorists approaching the temporary access road during deliveries. The flagmen will be equipped with radios providing communication with the delivery point. In a letter to staff, the Kern County Roads Department stated its concurrence with the location of and concept for the temporary access road (Kern County 1999). Staff has proposed a condition of certification that requires the applicant to provide two entrances to the power plant site: the existing access road at the intersection of Elk Hills Road and Skyline Road for normal traffic, and the temporary road off Elk Hills Road (about 600 feet north of Skyline Road) only for receiving deliveries of heavy and/or over-sized equipment and materials during project construction. To ensure that the applicant provides warning signs and flagmen during use of the temporary access road, staff has proposed a condition of certification requiring the applicant to prepare a Traffic Control Plan. Prior to construction of the temporary access road, the applicant will need to apply for an encroachment permit from Kern County. This requirement is included in staff's proposed conditions of certification.

#### TRUCK TRAFFIC

Construction materials, such as concrete, wire, pipe, cable, and steel will be delivered to the site by truck. Deliveries will include hazardous materials to be used during construction, such as gasoline, diesel fuel, and oil and lubricants (see AFC

Table 5.11-13). Whenever possible, the applicant will schedule deliveries of construction materials between the hours of 6:00 a.m. and 6:00 p.m. on weekdays (EHPP 1999a, page 5.11-19). Vehicles that exceed the load size and limits of certain roadways will require transportation permits from Caltrans and Kern County. Staff has proposed a condition of certification that ensures compliance with these permit requirements.

In total, construction of the EHPP is estimated to require approximately 3,500 truck deliveries to the power plant site over the 15-month construction period, with an average about 233 truck deliveries of construction materials per month. Assuming 20 workdays per month and two trips for each truck delivery (to and from the site), the project will produce approximately 24 truck trips per day on average (EHPP 1999a, page 5.11-19).

The applicant assumes that about 70 percent of truck deliveries will originate in Bakersfield. These drivers would use SR 99 south to SR 119, west to Elk Hills Road, and then north to the power plant site. About 20 percent would travel from the Los Angeles area via SR 99 or I-5 north to SR 119, then west to Elk Hills Road and north to the site. The remaining 10 percent would originate north of Bakersfield, travelling south on I-5 to Stockdale Highway, then west to Elk Hills Road and south to the site (EHPP 1999a, page 5.11-19).

Using the travel patterns described above, TRAFFIC AND TRANSPORTATION Table 6 presents a comparison of project-related truck traffic travelling to the site, with existing truck traffic. The increase of 12 trucks per day on average is minimal compared to existing truck traffic on highways in the project area, and represents a negligible increase (0.2 percent to 2 percent) in truck traffic. Therefore, the impact of construction-related truck traffic on highways will not be significant.

**TRAFFIC AND TRANSPORTATION Table 6**  
**Distribution of Plant Construction-Related Truck Traffic on Highways**

Highway	Existing AADT	Existing Truck AADT	Projected Average Truck Trips/Day	Average Increase in Truck Traffic
Interstate 5				
@ Jct. SR 119	22,400	8,000	22	Less than 1%
@ Jct. SR 58	23,500	7,520	2	Less than 1%
Highway 99				
@ Jct. SR 119	32,500	8,125	17	Less than 1%
SR 119				
@ I-5	5,800	1,102	22	2%
@ SR 99	9,900	2,178	17	Less than 1%

SOURCE: EHPP 1999a, Tables 5.11-8 and 5.11-2; page 5.11-19

The primary county road that will be used by trucks travelling to the project site will be Elk Hills Road. Construction-related truck traffic will result in a 12 to 14 percent average increase in truck traffic on Elk Hills Road north of SR 119. Due to the size and weight of these trucks, these increases will contribute to some wear on Elk Hills Road and may increase the need for regular roadway maintenance to meet safety

standards (EHPP 1999a, page 5.11-21). Staff has proposed a mitigation measure to ensure that the project owner repair any damage to Elk Hills Road as a result of construction-related truck traffic.

Whenever possible and cost-effective, the applicant intends to use railroad lines to minimize truck transport of heavy equipment and machinery (EHPP 1999a, page 5.11-19). The preferred rail line will be Union Pacific's Buttonwillow Branch, where cargo will be unloaded at the Buttonwillow Station located 8 miles to the north of the EHPP site. From the Buttonwillow Station, heavy equipment and machinery will be transported by truck south along Mirasol Avenue, west on Bright Road and south on Elk Hills Road.

Small quantities of hazardous wastes, such as waste oil and solvents, will be generated during project construction. During construction, about 4 truck trips per month will be required to haul hazardous waste for off-site disposal (EHPP 1999a, Table 5.11-3A). The applicant has stated its intent to comply with all applicable regulations governing the transportation of hazardous wastes (EHPP 1999a, page 5.11-21 – 22). Staff has proposed a condition of certification to ensure compliance.

## ***OPERATIONAL PHASE***

### **COMMUTE TRAFFIC**

Operation of the EHPP will require about 20 full-time employees. Assuming that each employee drives a separate vehicle to work and makes one round trip from home to work per day, operation of the power plant will generate about 40 vehicle trips per day. The applicant will provide adequate on-site parking for power plant employees (EHPP 1999a, page 5.11-24). It is assumed that the majority of the plant's workers will reside in Bakersfield and their preferred route to work will be west along SR 119 to Elk Hills Road, then north to the site. The commute traffic generated by operation of the project represents less than 1 percent of existing AADT on SR 119 and an estimated 5 percent of existing AADT on Elk Hills Road. This minimal amount of traffic will not have a significant impact on the state highways and local roads serving the project.

### **TRUCK TRAFFIC**

The transportation of hazardous substances associated with the project can increase roadway hazard potential. During operation, about 1 truck delivery every three weeks of anhydrous ammonia will be made to the power plant site (EHPP 1999a, page 5.11-24). Other hazardous materials, including hydrogen, will be delivered by truck to the plant site on a less frequent basis. (Please refer to AFC Table 5.11-3A for a complete list of the hazardous materials to be transported to the site and the quantity and frequency of delivery.) Hazardous wastes generated during project operation will be transported off site for disposal or recycling by licensed hazardous waste transporters about once every 90 days (EHPP 1999a, page 5.11-25 and Table 5.11-3A).

The applicant has identified several potential routes for the delivery of anhydrous ammonia. The two routes from Interstate 5 are from the north, SR 43 to SR 119 to

Elk Hills Road; and from the south, SR 119 to Elk Hills Road. The anticipated route from Bakersfield is SR 58 to SR 43 to SR 119 to Elk Hills Road. The state highways along these routes have been approved by the California Highway Patrol for use in the transportation of inhalation-related hazardous materials (Horgan, 1999, pers. comm.). Staff has limited its analysis of the potential traffic impacts associated with the transportation of anhydrous ammonia to the two-lane highways and local roads serving the project site. Staff has not included I-5 and SR 99 in the analysis since these highways are used continuously by commercial trucks. In addition, an October 1998 report prepared by the Office of Hazardous Materials Safety of the United States Department of Transportation (US DOT), found that two-lane, rural roads typically have much higher accident rates than divided, multi-lane interstate highways (US DOT 1998a, p. 8). Furthermore, 1998 data from the US DOT showed that 67 percent of fatal crashes involving large trucks occurred in rural areas (US DOT 1998b). California Unions for Reliable Energy (CURE) states in their comments on the PSA that "the risk of an accident resulting in a release [of anhydrous ammonia] is two to four times higher along urban freeways, two-lane, and multi-lane roadways with high traffic densities (roadways omitted from staff's analysis) than along their rural counterparts, such as those evaluated by staff" (CURE 1999c, p. 20). Based on the US DOT information cited above, staff respectfully disagrees with CURE's statement, and continues to limit its analysis of the potential traffic hazards associated with delivery of anhydrous ammonia to the two-lane highways and local roads serving the EHPP.

Visual observations by staff of State Routes 43, 58, and 119 did not identify any unusual traffic safety hazards. At-grade railroad crossings on SR 43 north of Stockdale Highway, and on SR 119 west of SR 99, are provided with active controls (lights, gates). In addition, staff spoke with the officer in charge at the Buttonwillow office of the California Highway Patrol, who stated that there are no unusual hazards or improperly designed facilities along the state highway routes with accident rates higher than the statewide average (SR 119 junction with SR 99 and the SR 43 junction with SR 58) (CHP, 1999). Staff also contacted Caltrans about the SR 119/99 and SR 43/58 junctions. While the accident rates are higher than the statewide average, the types of accidents occurring at these junctions do not indicate that these facilities are improperly designed (Sorensen, pers. comm., 1999). At staff's request, Caltrans looked into another junction with an accident rate three times higher than the statewide average, SR 43 at Panama Lane, just north of I-5. According to Caltrans, five accidents occurred at this intersection during the reporting period from July 1996 to June 1999. Three of the five accidents at this intersection were single-car accidents caused by drivers travelling too fast in the fog and running the stop sign on Panama Lane at SR 43. None of the accidents involved large trucks (Liu, pers. comm., 1999). A recent field check by Caltrans indicated that no changes are warranted at this junction (Sorensen, pers. comm., 1999). Staff also contacted the Kern County Roads Department to inquire about known traffic hazards on Elk Hills Road. Barry Hayslett stated the accident rate on Elk Hills Road is not exceptionally higher than any other county road, and that it can be traveled in a safe manner by safe and prudent drivers (Hayslett, 1999b, pers. comm.).

The US DOT's Office of Hazardous Materials Safety (OHM) maintains the Hazardous Materials Information System (HMIS), the principal source of safety data related to the transportation of hazardous materials. According to a report by OHM, 15,205 hazardous materials incidents were reported in 1998 for all modes of transportation (air, highway, railway, and water). Anhydrous ammonia was involved in 84 incidents, or 0.6 percent of the total incidents reported in 1998. For those incidents involving anhydrous ammonia, eight (less than 0.1 percent) were classified as "serious." An incident is defined as serious if the incident involved: 1) a fatality or major injury due to a hazardous material; 2) closure of a major transportation artery or facility or evacuation of six or more persons due to the presence of a hazardous material; or 3) a vehicle accident or derailment resulting in the release of a hazardous material. According to the data, no serious incidents involving anhydrous ammonia or any other hazardous material occurred in Kern County in 1998. From 1991 through 1998, incidents involving anhydrous ammonia resulted in one fatality, which occurred in 1996. The data does not identify where this fatality occurred or the mode of transportation (US DOT, 1998c).

Federal and state regulations are in place to ensure that the handling and transportation of hazardous materials on all roadways is done in a manner that protects public safety. Please see the LAWS, ORDINANCES, REGULATIONS, AND STANDARDS section of this report. Federal laws specific to this issue are Title 49, Code of Federal Regulations, Sections 350-399 and Appendices A-G, of the Federal Motor Carrier Safety Regulations. These sections address safety considerations for the transportation of goods, materials, and substances over public highways. In addition, truck tank design for anhydrous ammonia and other hazardous materials are federally mandated by US DOT specifications, and are designed for impact safety.

The California Vehicle Code and the Streets and Highways Code (Sections 31600 through 34510) are equally important to ensure that the transportation and handling of hazardous materials is done in a manner that protects public safety. Vehicle Code Section 31303 requires hazardous materials to be transported on the state or interstate highways that offer the least overall transit time. Section 32105 specifies that unless there is no alternative route, every driver of a vehicle transporting inhalation hazards shall avoid, by pre-arrangement of routes, driving into or through heavily populated areas, congested thoroughfares, or places where crowds are assembled. Enforcement of these statutes is under the jurisdiction of the California Highway Patrol. The State Department of Motor Vehicles specifically licenses all drivers who carry hazardous materials. Drivers are required to carry a manifest, available for inspection by the California Highway Patrol inspection stations along major highways and interstates; check for weight limits and conduct periodic brake inspections. Commercial truck operators handling hazardous materials are also required to take first aid instruction and procedures on handling hazardous waste spills.

Potential impacts of the transportation of hazardous materials are mitigated to a level of insignificance by compliance with federal and state standards established to regulate the transportation of hazardous substances. The applicant has stated its intent to comply with all federal and state requirements for the transportation of

hazardous materials (EHPP 1999a, Table 6.1-1, page 18). Staff has proposed conditions of certification that ensure compliance with federal, state and local permit and safety requirements.

## **LINEAR FACILITIES**

### ***CONSTRUCTION PHASE***

#### **TRANSMISSION LINE**

Construction of the transmission line is anticipated to take 9 months and require on average 24 workers per month. The construction workforce will peak at 32 workers during the 7th month in the construction schedule (EHPP 1999a, Table 5.8-5). This peak construction period does not coincide with the peak construction period for the power plant (the 8th month in the schedule). The power plant site will be used as a staging area. Workers will report to the plant site at the beginning of each workday, and distribute themselves as needed to various work sites along the transmission line route. Several crews will work simultaneously along the route to minimize the overall construction period (EHPP 1999a, page 5.11-22).

During peak construction of the transmission line, it is estimated that 16 pieces of heavy equipment will be used, including various trucks (pickup, boom, cement, and digger/auger) mobile cranes, cable puller, and infrequently, a helicopter. Construction materials such as pole foundation sections and tubular steel poles will also be delivered by truck to staging sites along the transmission line route (EHPP 1999a, page 5.11-23).

Elk Hills Road and Wasco Way will provide access to transmission line Routes 1A and 1B during construction. These roads currently operate at LOS A. Given the small number of truck deliveries along the transmission line routes, delivery of construction equipment and materials is not expected to have significant traffic impact on Elk Hills Road and Wasco Way. Existing oil field access roads will also provide access to the transmission line during construction. Use of these roads will further reduce impacts to the county-maintained roadways.

Route 1A will cross Elk Hills Road and Tupman Road. County roads crossed by Route 1B include Elk Hills Road, Stockdale Highway, and Bright Road. In addition, from MP 4.3 to 8.6 Route 1B (and Route 1B variation) would be installed within the right-of-way of Wasco Way. Construction of Route 1B (and Route 1B variation) may require the closure of a single lane along Wasco Way (a two-lane road). To minimize inconvenience to traffic (1,000 AADT), the applicant will only close one lane, and only during off-peak hours. The applicant has committed to using road signs and flagmen to caution and direct traffic around construction, as well as signs at nearby intersections to alert drivers to the construction and direct them to alternate routes (EHPP 1999c, data response #20). The crossings of Elk Hills and Tupman Roads and the work within the right-of-way of Wasco Way will require an encroachment permit from Kern County. The applicant has stated its intent to comply with Kern County encroachment permit requirements and staff has



proposed a condition of certification ensuring compliance with Kern County limitations for encroachment into public rights-of-way.

Route 1B will also require the crossing of State Route 58. SR 58 could be closed for short periods of time to accommodate the installation of conductors. Average daily traffic along SR 58 is approximately 4,800 vehicles, while peak traffic is approximately 700 vehicles per hour. Closure will be limited to off-peak hours. During construction, road signs and flagman will be used to caution and direct traffic. The applicant will follow Caltrans encroachment permit requirements for traffic control. If required by Caltrans, netting may be used to minimize the duration of the closure of SR 58. If Caltrans requires it, the applicant will post signs along SR 58 to notify motorists that delays may occur and advise them to take alternate routes (EHPP 1999c, data response #21). Staff has proposed conditions of certification requiring that the applicant comply with Caltrans limitations for encroachment into public rights-of-way.

State highways and local roads along the transmission line routes will continue to operate at acceptable levels of service. Use of routine construction safety measures and compliance with encroachment permit requirements should be sufficient to ensure no impacts.

#### **PIPELINES**

Construction of the natural gas, water supply and wastewater pipelines is anticipated to take 9 months and require on average 23 workers per month (EHPP 1999a, Table 5.8-5). Due to the small size of the construction workforce, staff does not anticipate any significant impacts to local roads and highways from commute traffic.

#### **NATURAL GAS PIPELINE**

The gas pipeline will be entirely on Occidental of Elk Hills, Inc. (OEHI) property and will not cross any local roads. No significant impact is anticipated.

#### **WATER SUPPLY PIPELINE**

An estimated 18 pieces of heavy equipment will be used during the peak construction period of the water supply pipeline (the 12th month in the construction schedule). In addition to heavy equipment, construction materials such as piping, concrete, reinforcing bar ("rebar"), and steel will be delivered by truck to staging sites along the pipeline route. Private roads, primarily Skyline Road, will provide access to the pipeline during construction. At crossings of minor roads, such as oil field roads, the pipeline will be installed by open cut trenching. The crossings at Tupman Road, Elk Hills Road, and SR 119 will be by drilling (EHPP 1999a, page 5.11-23). Given the small number of truck deliveries, and their distribution among multiple staging sites and work areas, and the use of drilling at major road crossings, no significant impacts to the local and state highways are anticipated from construction of the water supply line.

## WASTEWATER PIPELINE

The wastewater pipeline only crosses one local road, Elk Hills Road, and is entirely on OEHI property. The crossing of Elk Hills Road will be by drilling underneath the roadway. Private oil field roads will provide access to the pipeline during construction. For these reasons, no significant impact to local roads and highways is expected from construction of the wastewater pipeline.

## CUMULATIVE IMPACTS

The cumulative analysis for traffic and transportation takes into consideration the La Paloma Generating Project, the Sunrise Cogeneration Project, and the Midway-Sunset Project. As shown in Table 5.18-12 of the EHPP AFC, the construction schedules for all of these projects will overlap to some degree. It should be noted that delays could occur in the permitting process for these projects, affecting the start date for construction.

Due to the distances between the EHPP and La Paloma, Sunrise, and Midway-Sunset projects, traffic for the EHPP will not use the same county roads as the other power plant projects. Therefore, staff does not anticipate any significant cumulative impacts to local roads during construction and operation of the EHPP.

Commute traffic for the La Paloma project will primarily use State Routes 33, 58, and 166. The majority (80 percent) of construction-related truck traffic for the La Paloma project will use SR 58 west to SR 33. The remaining 20 percent will use SR 166 to SR 33 (LPGP, 1998a). These are not the primary highways to be used by commute and truck traffic travelling to the EHPP. Therefore, staff would not expect any significant cumulative impacts to state highways as a result of the EHPP and La Paloma projects.

It is assumed that commute traffic for the Sunrise project will use SR 43, SR 58, SR 99, and SR 119 (SCPP 1999a, page 8.10-14). These are the same highways that will be used by EHPP commute traffic. Sunrise would add 266 vehicle trips per day to the SR 119/43 junction during the peak construction period of the Sunrise project (SCPP 1999a, Table 8.10-7). If the majority (e.g., 80 percent) of these trips were made during the peak hour, LOS would drop to E with EHPP and Sunrise traffic combined. However, in the Sunrise case, staff has proposed a condition of certification (TRANS-4) requiring the preparation of a traffic control plan which establishes construction work hours outside of peak traffic periods (CEC 1999). In addition, staff would expect that some workers will carpool, and there are alternate routes from Bakersfield (e.g., SR 58) that likely will be used by workers commuting to the EHPP and Sunrise project sites, thereby reducing the number of vehicles at the SR 119/43 junction. Thus, staff does not anticipate a significant cumulative impact at the SR 119/43 junction. Sunrise traffic travelling through the SR 119/99 junction would amount to an additional 125 vehicle trips per day or about 50 peak hour trips. These trips will not result in a further decrease in Peak Hour LOS (i.e., LOS F) at the SR 119/99 junction. For this reason, and the reasons stated above (i.e., off-peak travel, alternate routes), staff would anticipate any cumulative impact at the SR 119/99 junction to be less than significant. Other segments of the state highways shared by EHPP and Sunrise traffic will operate at peak hour levels-of-

service ranging from LOS A to LOS C during peak construction of the EHPP. Therefore, staff concludes that adequate capacity is available on these highway segments to accommodate both the EHPP and Sunrise projects without a reduction in LOS to significant adverse level (i.e., LOS E or F).

An AFC for the Midway-Sunset project is expected sometime in November 1999. Staff would anticipate cumulative impacts to the state highways to be less than significant considering that construction of the Midway-Sunset project would not begin until sometime after peak construction of the EHPP and Sunrise projects, and by that time the traffic impacts of these projects would be declining.

## **COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS**

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### **FEDERAL**

The applicant has stated its intention to comply with all federal LORS. Staff has proposed a condition of certification to ensure compliance. Staff believes such compliance will not present any unusual difficulties. Therefore, the project is considered consistent with identified federal LORS.

### **STATE**

The applicant has stated its intention to comply with all state LORS. Staff has proposed a condition of certification to ensure compliance. Staff believes such compliance will not present any unusual difficulties. Therefore, the project is considered consistent with identified state LORS.

### **LOCAL**

The applicant has stated its intent to comply with Kern County requirements for encroachment into public rights-of-way and the goals and policies contained in the Kern County General Plan Circulation Element (EHPP 1999a, Table 6.1-1, page 18). The project will be consistent with the following applicable policies from the Kern County Circulation Element:

Private Development Access to Existing Roadway Network: Requires private developments to provide access to the existing road network and that these roads be constructed to County standards. Compliance with this requirement will be ensured by staff's proposed condition of certification **LAND-1** (please see the **LAND USE** section of this report).

Growth Beyond 2010: Developers must demonstrate that sufficient transportation capacity is available to serve the proposed project at LOS D or better. All county roadways potentially affected by the project or currently operating at LOS A. The EHPP will not reduce LOS on these roadways during construction or operation of the project.

Transportation of Hazardous Materials: This policy states that Kern County and affected cities should reduce the use of county maintained roads for the transportation of hazardous materials. Staff contacted the Kern County Roads Department to inquire if any restrictions are in place on the transportation of hazardous materials on Elk Hills Road. Mr. Hayslett stated that no restrictions apply to legal vehicles (Hayslett, 1999a, pers. comm.).

Damaged Road Pavement: This policy states that the County shall continue to maintain pavement conditions. Staff has proposed a condition of certification requiring the applicant to repair any damage to Elk Hills Road as a result of construction truck traffic.

## **FACILITY CLOSURE**

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There are at least three circumstances in which a facility closure can take place: planned closure, unexpected temporary closure and unexpected permanent closure.

### **PLANNED CLOSURE**

Planned closure occurs at the end of a project's life, when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence. The applicant will prepare a Facility Closure Plan for submittal to the Energy Commission for review and approval, at least twelve months prior to the proposed closure. At the time of closure, all then-applicable LORS will be identified and the closure plan will address with how these LORS will be complied.

### **UNEXPECTED TEMPORARY CLOSURE**

Unexpected temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster, or an emergency. In the event of temporary closure, the effects on traffic and transportation would be similar to those for normal operation of the power plant facility, and the applicant would have to comply with all applicable LORS section with respect to transportation permits for hazardous materials and equipment deliveries and removal.

### **UNEXPECTED PERMANENT CLOSURE**

Unexpected permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. Staff assumes that the facility will either remain idle until such time that new ownership is established, or dismantling of the facility will occur. In any event, the owner will have to secure applicable transportation permits to satisfy the LORS requirements as stated in this report.

In the event of permanent closure, the effects would be similar to those associated with project construction. Permanent closure will involve a peak work period with commute traffic. In either instance, the roadway systems within the vicinity of the project should be able to handle closure-related traffic without a significant impact on the current LOS of the area roads.

## **MITIGATION**

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The applicant has indicated its intention to comply with all LORS relating to: 1) the transport of oversized loads, 2) the transport of hazardous materials, and 3) Caltrans and Kern County requirements for encroachment permits for construction activities within public rights-of-way.

If the traffic signal planned for the State Route 119/99 junction has not been installed prior to the start of construction of the EHPP, staff has proposed a mitigation measure to address the temporary impact to this junction during the construction phase of the project. The potential for the AFC proposed site access road to have a significant impact has been avoided by the applicant's new proposal to utilize the existing access road at Skyline Road and to only use the temporary road off Elk Hills Road for heavy and/or oversized deliveries in conjunction with warning signs and flagmen. Staff has proposed a condition of certification requiring the applicant to provide the two entrances to the power plant site. Staff has also proposed mitigation for the repair of roadway pavement due to heavy truck traffic on Elk Hills Road during construction of the project.

## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSIONS**

#### ***POWER PLANT***

1. During the construction phase, except for one section of highway, increased roadway demand resulting from the daily movement of workers and materials, while noticeable, will not increase beyond thresholds established by local and state authorities. For the roadway segment that will drop to a significant adverse level (LOS E), staff has proposed mitigation (if necessary).
2. During the operational phase, increased roadway demand resulting from the daily movement of workers and materials will be minimal.
3. All transportation and handling of hazardous substances can be mitigated to insignificance by compliance with federal and state standards established to regulate hazardous substances.

#### ***LINEAR FACILITIES***

4. Construction of the transmission lines will have minimal impacts on the function of area roadways. Construction of transmission line Route 1B may require closure of Wasco Way (one lane only) and State Route 58 for short

periods of time. Closure will be restricted to off-peak hours. Routine construction safety measures and required encroachment permits should be sufficient to ensure no impacts.

5. Construction of the supply pipelines will have minimal impacts on the function of area roadways. Major roadway crossings (Elk Hills Road, Tupman Road, and State Route 119) will be constructed by drilling underneath these roadways, resulting in minimal impacts to traffic. In addition, development will take place in compliance with Kern County and Caltrans limitations for encroachment into public rights of way.

## RECOMMENDATION

If the Energy Commission certifies the EHPP, staff recommends that the Commission adopt staff's proposed conditions of certification.

## CONDITIONS OF CERTIFICATION

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**TRANS-1** The project owner shall comply with Caltrans and Kern County limitations on vehicle sizes and weights. In addition, the project owner or its contractor shall obtain necessary transportation permits from Caltrans and all relevant jurisdictions for roadway use.

**Verification:** In the Monthly Compliance Reports during construction, and in the Annual Compliance Reports during operation, the project owner shall submit copies of any oversize and overweight transportation permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after receipt of these permits.

**TRANS-2** The project owner or its contractor shall comply with Caltrans and Kern County limitations for encroachment into public rights-of-way and shall obtain necessary encroachment permits from Caltrans and all relevant jurisdictions.

**Verification:** In Monthly Compliance Reports during construction, and in the Annual Compliance Reports during operation, the project owner shall submit copies of any encroachment permits received during the reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after receipt of these permits.

**TRANS-3** The project owner shall ensure that all federal and state regulations for the transport of hazardous materials are observed during both construction and operation of the facility.

**Verification:** The project owner shall provide, in their Monthly Compliance Reports to the CPM, copies of all permits and licenses of the haulers contracted to transport hazardous substances.

**TRANS-4** The project owner or its contractor shall install crossing structures and netting, if required by Caltrans, across State Route 58 as a safety precaution and to reduce the potential for damage from falling construction materials or equipment during cable-stringing activities. Prior to cable stringing, the project owner shall consult with Caltrans, and prepare and submit to the CPM a safety plan and implementation program.

**Verification:** At least 30 days prior to wire stringing, the project owner shall provide to the CPM for review and approval, a copy of its safety plan and implementation program.

**TRANS-5** Following construction of the power plant and all related facilities, the project owner shall meet with the CPM and Kern County to determine if any actions are necessary and develop a schedule to complete the repair of any roadways damaged due to project construction.

**Protocol:** Prior to start of construction, the project owner shall photograph the road pavement on Elk Hills Road from the junction of State Route 119 north to the project site. The project owner shall provide the CPM and Kern County with a copy of these photographs. Following project construction, the project owner will meet with the CPM and Kern County to determine the project-related road damage, if any.

**Verification:** Prior to the start of construction, the project owner shall provide the CPM and Kern County a copy of the roadway photographs. Within 30 days of the completion of project construction, the project owner shall meet with the CPM and Kern County and determine if any roadway repairs are necessary. The project owner shall provide a copy of a letter from Kern County acknowledging satisfactory completion of the roadway repairs, if necessary, in the first Annual Compliance Report following start of operation of the Elk Hills Power Project.

**TRANS-6** If the traffic signal planned for the State Route 119/99 junction is not in place prior to the start of construction of the Elk Hills Power Project, the project owner shall provide traffic control at the SR 119/99 junction during construction of the EHPP through the use of a policeman/flagman during peak traffic hours. The project owner shall provide traffic control during the construction phase of the Elk Hills Power Project until the traffic signal is installed.

**Protocol:** The use of a policeman/flagman requires that a Traffic Control Plan be submitted to Caltrans prior to issuance of a permit.

**Verification:** At least 45 days prior to start of project construction, the project owner shall submit a Traffic Control Plan to Caltrans for approval. The project owner shall provide the CPM a copy of a letter from Caltrans acknowledging approval of the Traffic Control Plan at least 15 days prior to the start of construction.

**TRANS-7** The project owner shall provide two entrances to the Elk Hills Power Project. The project owner shall direct normal traffic to and from the power plant site through the existing Occidental of Elk Hills, Inc. gate located on the west side of Elk Hills Road at Skyline Road. The project owner shall construct a temporary, 40-foot wide, 135-foot long access road extending from Elk Hills Road approximately 600 feet north of the intersection of Skyline Road and Elk Hills Road. The project owner shall only utilize the temporary access road for receiving heavy and over-sized equipment and materials during project construction.

**Verification:** At least 30 days prior to the start of project construction, the project owner shall provide the CPM with written documentation explaining how the project owner will direct normal traffic to utilize the existing access road at Skyline Road. The project owner also shall document how normal traffic will be prevented from using the temporary access road off Elk Hills Road north of Skyline Road, which is intended only for use by trucks delivering heavy and/or over-sized construction equipment and materials. At least 30 days prior to the start of project construction, the project owner also shall provide the CPM a copy of the approved encroachment permit that Kern County requires for construction of the temporary access road off Elk Hills Road.

**TRANS-8** Prior to the start of project construction, the project owner shall consult with Kern County, and prepare and submit to the CPM for approval a construction traffic control plan and implementation program for use of the temporary access road off Elk Hills Road and north of Skyline Road by trucks delivering heavy and/or over-sized construction equipment and materials. The plan shall address the following issues:

- timing of heavy and/or over-sized equipment and materials deliveries;
- signing, lighting, and traffic control device placement; and
- use of a flagmen.

**Verification:** Verification: At least 30 days prior to start of project construction, the project owner shall provide the CPM for review and approval, a copy of its construction traffic control plan and implementation program.



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# NOISE

## Testimony of Kisabuli

### INTRODUCTION

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The construction and operation of any power plant creates noise. The character and loudness of this noise, the times of day or night during which it is produced, and the proximity of the facility to sensitive receptors combine to determine whether a proposed project will meet applicable noise control laws and ordinances, and whether it will exhibit significant adverse environmental impacts.

The purpose of this analysis is to identify the likely noise impacts from the Elk Hills Power Project (EHPP) and to recommend conditions to ensure that the resulting noise impacts will comply with all applicable laws, ordinances, regulations and standards.

Before certifying the EHPP, the Energy Commission must find that the project:

6. will likely be built and operated in compliance with all applicable noise laws, ordinances, regulations and standards; and
7. will present no significant adverse noise impacts, or none that have not been mitigated to the extent feasible.

For a description of the terms used to describe noise and methods to measure and evaluate noise, please see **"NOISE: Appendix A"**.

### LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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#### FEDERAL

Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations (29 CFR § 1910.95) that establish maximum noise levels to which workers at a facility may be exposed. These OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time during which the worker is exposed. (Please see **Noise: Appendix A, Table A4** immediately following this section.) OSHA regulations also dictate hearing conservation program requirements and workplace noise monitoring requirements. The administering agency for the above authority is the Federal Occupational Safety and Health Administration (Fed-OSHA).

Noise Control Act of 1972 42 USC 6 4901 et seq. 40 CFR Parts 201-211. This Act sets performance standards for noise emissions from "major sources." The Environmental Protection Agency (EPA) has identified a day/night level (Ldn) of

55 dBA<sup>1</sup> as providing reasonable protection against community annoyance and activity interference due to noise. The Noise Control Act is administered by EPA.

There are no federal laws governing off-site (community) noise.

## **STATE**

Similarly, there are no state regulations governing off-site (community) noise. Rather, state planning law (Gov. Code, § 65300) requires that all counties and cities prepare and adopt a General Plan. Government Code section 65302(f) requires that a noise element be prepared as part of the General Plan. This element is to “address existing and foreseeable noise problems....” Other state laws, ordinances, regulations and standards (LORS) include the California Environmental Quality Act (CEQA) and the California Occupational Safety and Health Act (Cal-OSHA).

California Vehicle Code, sections 23130 and 23130.5, sets noise limits for highway vehicles. The California Highway Patrol and the Kern County Sheriff's Office administer the vehicle code.

## **CAL-OSHA**

California Occupational Safety and Health Administration (Cal-OSHA) has promulgated Occupational Noise Exposure Regulations that set employee noise exposure limits.

Cal-OSHA regulations (Cal. Code Regs., tit. 8, and § 5095 et seq.) are the same as the federal OSHA criteria described above. The criteria are based on a worker's noise level exposure over a specific time period. Maximum permissible worker noise exposure levels to protect against damage to the workers' hearing have been established. The administering agency is Cal-OSHA.

## **CEQA**

California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified, and that such impacts be eliminated or mitigated to the extent feasible. The applicable CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq., Appendix G § XI) explain that a significant effect from noise may exist if a project would result in:

8. Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
9. Exposure of persons to, or generation of, excessive ground borne vibration or ground borne noise levels.
10. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

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<sup>1</sup> Please see **Noise: Appendix A**, immediately following this section, for the definition of dBA and other definitions used throughout this report.

11. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

## LOCAL

### ***KERN COUNTY GENERAL PLAN - NOISE ELEMENT***

The Kern County General Plan 1989 contains a Noise Element that establishes environmental noise limits based on the land use of the property receiving the noise. The permissible noise levels are outlined below in **NOISE: Table 1**. The administering agency for the above authority is the Kern County Department of Planning and Development Services.

These standards limit L<sub>50</sub> or median noise levels during the day to 50 dBA, and at night to 40 dBA at highly noise-sensitive locations such as isolated rural residences.

**NOISE: Table 1**  
**Kern County General Plan-Noise Element**

Land Use Category	Maximum Permissible Sound Level		
	L <sub>50</sub> (Day)	L <sub>50</sub> (Night)	CNEL
Non-sensitive Land Uses	65	60	75
Moderately Sensitive Land Uses	60	55	70
Sensitive Land Uses	55	45	65
Highly Sensitive Land Uses	50	40	60

## SETTING

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The proposed power plant site is near the center of the Elk Hills Oil and Gas Field and is surrounded by oil wells and other oil field related equipment such as large reciprocating engines, pumps, compressors and a gas turbine powered cogeneration plant.

The nearest residence is approximately 5.1 miles to the northeast of the power plant site. Isolated farms exist at this distance to the northeast beyond the California Aqueduct. The nearest communities include Valley Acres and Dustin Acres 6 miles to the southeast, Tupman 6.9 miles east, Derby Acres 7.5 miles west-southwest, Buttonwillow 8.3 miles north and McKittrick 8.75 miles west.

There are no schools, hospitals or other sensitive receptors within a 2-mile radius of the powerplant (identified by staff as an area outside which construction and operation of a powerplant project is not likely to cause noise impacts). Please see the Project Description section for more details on the site and setting.

## AMBIENT NOISE SURVEY

The Energy Commission's power plant certification regulations require that noise measurements be made at noise-sensitive locations where there is a potential for

an increase of 5 dBA or more over existing background noise levels during construction or operation of a proposed power plant.

A recent noise survey performed within an oil field near the edge of the town of McKittrick (LPGC, 1998) indicates that hourly  $L_{90}$  background levels range from 34 dBA to 43 dBA. The minimum background level was about the same, at 34 to 34.5 dBA, regardless of location. The uniformity of the minimum background levels occurs because the background is a composite of noise from many distant sources. Background levels as low as 40 dBA are rarely found in developed areas (EPA, 1974), but they can be experienced in remote areas distant from freeways and other sources of man-made noise. The very low minimum background level of 34 dBA measured near McKittrick is assumed to be representative throughout the study area for the EHPP.

The power plant will not cause an increase in the noise levels, as it will be significantly below ambient noise levels at the nearest receptor. Noise Levels projected from the powerplant at the nearest noise-sensitive location, a residence about 5.1 miles from the power plant site, will be about 22 dBA, whereas the existing minimum background levels at any residence are about 34 dBA. Consequently, no noise measurements are necessary (Baker, 1998).

## **SIGNIFICANCE CRITERIA**

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The most stringent noise level required by any of the applicable LORS is the controlling criterion in the design of the noise control features of the project. In this case, the most stringent criterion is the hourly nighttime median noise level ( $L_{50}$ ) of 40 dBA as specified in the Kern County General Plan. The level is applicable at the nearest residence approximately 5.1 miles to the north-northeast of the EHPP. Isolated rural residences are considered highly noise-sensitive receptors.

The significance of a noise impact is also a function of the change or increase in noise levels over existing ambient noise levels at any noise-sensitive receptor. An increase of 5 dBA or greater is considered significant.

## **ENVIRONMENTAL NOISE IMPACTS**

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Noise will be produced at the power plant site and along the corridors for linear project features during the construction and operation of the project. This assessment includes impacts from both construction and operation activities and their potential effects at the nearest sensitive receptors, and to power plant operations personnel. An essential part of this assessment is a comparison of expected noise levels with acceptable noise levels presented in applicable LORS, and with existing background levels at noise-sensitive receptors.

## CONSTRUCTION NOISE

### **POWER PLANT**

Construction of the project is expected to take up to 16 months, with varying degrees of activity occurring during the different phases of construction. The construction of the power plant can generally be divided into five phases, which utilize different types of construction equipment. The five phases are: 1) site preparation and excavation; 2) concrete pouring; 3) steel erection; 4) mechanical; and 5) clean-up (Miller et al. 1978). The typical high-pressure steam blow activity performed during the final stage of construction is assessed separately below because of the high noise levels and potential for a greater noise impact.

Both the US EPA Office of Noise Abatement and Control and the Empire State Electric Energy Research Company have extensively studied noise from individual pieces of construction equipment as well as from construction sites of power plants and other types of facilities (US EPA 1971, Barnes et al. 1976). The loudest equipment types generally operating at a site during each phase of construction are presented in **NOISE: Table 3**. The composite average or equivalent site noise level, representing noise from all equipment, is also presented in the table for each phase.

**NOISE: Table 3**  
**Construction equipment and composite site noise levels.**

Construction Phase	Noise Construction Equipment	Equipment Noise Level (dBA)	Composite Site Noise Level @ 50 ft. (dBA)
Excavation	Pile driver	101	89
	Dump truck	91	
	Rock drill	98	
Concrete pour	Truck	91	78
	Concrete mixer	85	
Steel erection	Derrick crane	88	87
	Jack hammer	88	
Mechanical	Derrick crane	88	87
	Pneumatic tools	86	
Clean-up	Truck	91	89
	Steam blow (unmuffled)	110 @ 1,000'	

Source: EPA, 1971 and Barnes, 1976.

The composite noise levels were based on intensive noise monitoring during the construction of 15 actual power plants. The noise monitoring for the composite levels was done at locations selected to avoid undue excess attenuation from atmospheric conditions and terrain. The construction equipment were characterized as typical.

One important consideration in using these data is that the measurements are almost 30 years old. Thus, they probably overestimate actual construction noise since there has been a trend towards quieter equipment in the intervening years. In spite of this consideration, these data are comprehensive and have the advantage

of integrating significant variability to arrive at an average impact from each phase of construction.

### **LINEAR FACILITIES**

The plant switchyard will be connected to the PG&E transmission system via a new, 230 kV transmission line. Three alternatives have been identified. Route 1A (9 miles long), route 1B (8.6 miles long), and route 1B revised (8.5 miles long).

Natural gas is conveyed to the power plant site via a new 2,500-foot, 10-inch supply pipeline. The route lies entirely within the Elk Hills Oil and Gas Field boundaries. The new pipeline is positioned above ground on pipe supports.

West Kern Water District (WKWD) will supply water for the project. The water will be conveyed via a new 9.8 mile, 16-inch water pipeline extending from the existing WKWD facilities. A portion (4.1 miles) of the pipeline will be underground and the rest (5.7 miles) will be above ground on pipe supports.

### **COMMUNITY NOISE EXPOSURE (CONSTRUCTION)**

#### **POWER PLANT**

Average or equivalent construction noise levels projected to the nearest residence from the power plant site were developed using the computer model NoiseCALC (Driscoll, 1985). Average noise levels during construction are projected to range between 3 dBA and 15 dBA, depending upon construction phase, at the nearest residence at a distance of 5.1 miles from the power plant site. These levels are well below ambient noise levels at the location, and the noise will be inaudible under all conditions. All sensitive receptors, such as schools, hospitals, elderly care facilities or other highly noise-sensitive facilities, are located more than 6 miles from the power plant site and are well beyond the potential area of impact.

High-pressure steam blows produce noise levels of approximately 130 dBA at 100 feet. This attenuates to a level of about 11 dBA at the nearest residence at 5.1 miles. Steam blow noise attenuates faster with distance than other construction noise dominated by diesel engines because it is at a higher frequency. The steam blowing will be inaudible at the nearest residence.

### **WORKER NOISE EXPOSURE (CONSTRUCTION)**

#### **POWER PLANT AND LINEAR FACILITIES**

A reference distance of 100 feet was used in the AFC to evaluate on-site construction noise levels and their potential impacts on workers. The noise levels will vary significantly depending on whether a worker is closer to or conducting a noisy activity, but the  $L_{eq}$  levels are projected to average between 75 and 85 dBA during the first four phases of construction. Undoubtedly, some workers will occasionally be exposed to noise levels above 85<sup>2</sup> dBA during construction. The

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<sup>2</sup> OSHA does not consider noise levels of 85 dBA or less hazardous to employee health.



applicant predicts that construction noise levels will not reach levels that require worker protection, but will put in place the use of engineering controls, administrative controls, and hearing protection devices.

To ensure that workers are adequately protected, staff has proposed a condition of certification (see proposed Condition of Certification **NOISE-3**, below).

## **OPERATIONAL NOISE**

### ***POWER PLANT***

Noise levels produced by a GE Frame 7F Combustion Turbine/Generator Package and similar power plant equipment were modeled using the NoiseCALC computer model (Driscoll 1985). Attenuating mechanisms employed by the model included divergence of the sound wave and atmospheric absorption. No ground effects attenuation due to vegetation or terrain were included in the modeling. In modeling the noise impacts to the sensitive receptors, the major pieces of equipment were assumed to operate continuously.

The model determined the total noise level that would be expected at various distances from the power plant site. Since specific equipment has not yet been selected, noise levels for standard power plant equipment of the appropriate size and fitted with typical silencing measures were employed in the modeling exercise.

The analysis shows that the expected power plant noise level at the nearest residence to the north-northeast, at a distance of 5.1 miles is about 22 dBA. Since this level is well below the Kern County standard of 40 dBA for highly sensitive land uses, and well below existing ambient noise levels, no additional noise control measures will be necessary. Furthermore, all sensitive receptors, such as schools, hospitals, elderly care facilities or other highly noise-sensitive facilities, are located more than 6 miles from the power plant site and are thus well beyond the potential area of impact.

### ***COMMUNITY NOISE IMPACTS (OPERATION)***

#### **POWER PLANT**

During its operating life, the project will represent essentially a steady, continuous and broadband noise source day and night. Occasional short-term increases in noise level will occur as steam relief valves open to vent pressure, or during startup or shutdown as the plant transitions to and from steady-state operation. At other times, such as when the plant is shut down for lack of dispatch or for maintenance, noise levels will decrease.

### ***TONAL AND INTERMITTENT NOISES***

One possible source of noise annoyance would be strong tonal noises, individual sounds that, while not louder than the permissible levels, stand out in sound quality. To ensure the avoidance of such tonal sound, the noise control design of the EHPP

can be balanced to bring as many noise sources as possible to the same relative sound level, causing them all to blend without any one source standing out.

The project owner proposes that no prominent tonal noise emissions will be present. The generators, transformers, and combustion turbine compressor inlet produce tonal sound levels; however, the generator enclosure and combustion turbine inlet silencers will be designed to reduce the tonal emissions from these sources to levels below the general plant noise. In addition, the transformer tonal noise emissions will be below the broadband plant noise. Therefore, any equipment tonal emissions will not be distinctly audible at any off-site locations.

Another potentially annoying source of noise from a power plant is the intermittent or occasional actuation of steam relief valves. The hissing noise from these valves can be largely mitigated by the installation of adequate mufflers. To ensure that adequate measures are taken to mitigate tonal and intermittent noise sources, staff has proposed measures (see proposed Condition of Certification **NOISE-4**, below) to ensure that tonal and intermittent steam relief noises are not allowed to cause a problem.

#### LINEAR FACILITIES

Transmission line alternative routes 1B and 1B variation passes close to five rural residences. The nearest residence is approximately 80 feet from the transmission line right-of-way and the others are more than 100 feet from the right-of-way.

High voltage transmission lines can produce a hissing sound as a result of corona discharge from the conductors. The noise level is a function of voltage and is most evident at higher voltages. Power lines with voltages less than 230 kV rarely produce an audible corona discharge noise because there is little or no discharge at these lower voltages. The sound from 230 kV lines, as proposed for EHPP, is generally inaudible at distances greater than 50 feet from the conductor bundle except during rainy or high humidity conditions. Noise from the EHPP transmission lines will not produce a significant noise impact at any residence because of the infrequency of rainy or high humidity conditions and the low noise level on the rare occasions that it does occur.

For transmission line alternative Route 1A, a switchyard located at the point of interconnection with the existing 230 kilovolt (kV) transmission line will also emit a low level of noise similar to the transmission line. The noise from the switchyard will generally be inaudible at the switchyard property line. The noise from the switchyard will not be audible at the nearest residence in Tupman, which is more than 2,000 feet from the switchyard.

Water pumps to be constructed at the West Kern Water District (WKWD) water storage and distribution yard for the water supply pipeline will produce noise levels of approximately 64 dBA at 50 feet while operating but will not impact the nearest rural residence, which is located more than 900 feet from the pumps.

## ***NOISE IMPACTS TO WORKERS (OPERATION)***

### **POWER PLANT AND LINEAR FACILITIES**

Workers will be exposed to noise levels in the range of 70 to 90 dBA, depending upon their distance from equipment. All equipment will be specified to produce near-field noise levels of 85 dBA or less as a means of reducing employee noise exposures. However, due to the additive effect of noise, some areas will experience levels higher than 85 dBA.

These areas will be marked, as "High Noise" areas and hearing protection will be required. All employees who have the potential to receive a noise exposure greater than 85 dBA over an 8-hour work shift will be included in a hearing conservation program that includes all the elements required by OSHA regulations. The noise exposures of all employees will be maintained below the OSHA level of 90 dBA over an 8-hour shift through the use of engineering controls, administrative controls, and hearing protection devices. Staff has proposed measures (see proposed Condition of Certification **NOISE-5**, below) to ensure compliance.

## **CUMULATIVE IMPACTS**

The cumulative impacts discussion for the EHPP is based on CEQA and the CEQA Guidelines which require that the discussion of cumulative impacts be "guided by the standards of practicality and reasonableness" (Public Resources Code (PRC) §21083(b)); and that "the discussion include a list of past, present, and reasonably anticipated future projects producing related or cumulative impacts" (California Code of Regulations (CCR) §15130(b)(1)(A)). The CEQA Guidelines require that cumulative impacts are discussed when they are significant, and that the discussions of cumulative impacts reflect the severity of the impacts and their likelihood of occurrence. However, the Guidelines states that the cumulative impacts discussion need not be provided in as great detail as is provided for the proposed project.

Therefore, the purpose of this analysis is to:

12. Identify past, present, and reasonably foreseeable actions in the project area that could affect noise at the EHPP.
13. Determine if the impacts of the EHPP and the other actions would overlap in time or geographic extent.
14. Determine if the impacts of the proposed project would interact with, or intensify, the impacts of the other actions.
15. Identify any potentially significant cumulative impacts.

Projects within the EHPP Area of Influence: The EHPP includes a generating plant and ancillary facilities (i.e., transmission line, natural gas pipeline, and water supply and wastewater disposal pipelines). For this discussion of cumulative impacts, the general geographic area of influence is defined as an approximate 15-mile radius around the power plant, or within 1 mile of the linear facilities.

Projects identified for consideration in this discussion of cumulative impacts include those: 1) where an application has been submitted to local jurisdictions for required approvals and permits; and/or 2) that have been previously approved and may be implemented in the near future. Projects within the area of influence are La Paloma, Sunrise, and Midway-Sunset power plants.

All of the projects identified above fall under the review and certification process of the Energy Commission. All of the projects are within 15 miles of EHPP and have a construction schedule that overlaps with EHPP. These three projects are considered in the cumulative impact analysis. A fourth project, Pastoria Power Project, is more than 15 miles from EHPP and was therefore not included in the cumulative analysis.

The nearest planned project is the La Paloma Generating Project about 6.7 miles to the west. Due to this great distance, there will be no significant cumulative noise impacts. No significant, unavoidable adverse cumulative impact on noise resources is anticipated during the construction and operation of the EHPP.

### ***MITIGATION MEASURES***

The construction and normal operation of the EHPP can create noise impacts. Noise control measures typical of standard combustion turbine powered plants and considered in this analysis include (to be employed as appropriate):

16. standard outdoor/weather enclosures for the combustion turbine generator packages and air inlet silencers on the combustion turbines; and
17. an outdoor thermal/acoustical lagging over the steam turbine.

These sorts of noise attenuation measures have been employed for years on similar facilities, and their noise control abilities are well known. Staff has proposed measures (see proposed Condition of Certification **NOISE-4** below) to ensure that these noise mitigation measures are carried out, and that they are effective.

The project will be designed to meet the Kern County noise limit, which is 40 dBA at night. Since the plant will operate at an essentially constant noise level, daytime levels will be similar. No mitigation measures, other than those already included in the standard plant design, are necessary.

In addition, construction is customarily performed during the daytime, and would cause no impacts at night, when quiet is most important. Staff has proposed a noise complaint process (see **NOISE-1** and **NOISE-2**, below) that will allow any person experiencing annoyance to address the problem with the applicant. Staff has also proposed a condition (see **NOISE-6**, below) to restrict noisy construction work to daytime hours.

Staff believes no significant adverse noise impacts are likely to occur due to construction or operation of the transmission line.

Construction workers may be exposed to significant noise levels, occasionally exceeding 85 dBA. An effective hearing conservation program, noise monitoring and hearing protection required under **NOISE-3** will constitute effective mitigation measures to safeguard employee health.

## **FACILITY CLOSURE**

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Upon closure of the facility, all operational noise will cease; no further adverse impacts from operation will be possible. The remaining potential noise source will be that caused by dismantling of the structures and equipment, and any site restoration work that may be performed. Since this noise will be similar to that caused by the original construction of the project, it can be treated similarly. That is, noisy work can be performed during daytime hours, with machinery and equipment properly equipped with mufflers. Any noise laws, ordinances, regulations and standards then in existence would apply; applicable Conditions of Certification included in the Energy Commission Decision would also apply unless properly modified.

## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSIONS**

Staff concludes that the EHPP will likely be built and operated to comply with all applicable noise laws, ordinances, regulations and standards. Staff further concludes that the EHPP will likely present no significant adverse noise impacts. The EHPP will likely represent an unobtrusive, nearly undetectable addition to existing noise levels.

### **RECOMMENDATIONS**

Staff recommends the conditions of certification proposed below be included in the Commission Decision.

## **PROPOSED CONDITIONS OF CERTIFICATION**

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**NOISE-1** Prior to the start of rough grading, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the EHPP. If the telephone is not staffed 24 hours per day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number shall also be posted at the EHPP site during construction in a manner visible to passersby. This telephone number shall be maintained until the EHPP has been operational for at least one year.

**Verification:** The project owner shall transmit to the Compliance Project Manager (CPM) in the first monthly construction report following the start of rough grading, a statement signed by the project manager attesting that the telephone number has been established and posted at the site.

**NOISE-2** Throughout the construction and operation of the EHPP, the project owner shall document, investigate, evaluate, and attempt to resolve all project related noise complaints.

**Protocol:** The project owner shall:

18. use the Noise Complaint Resolution Form (see below for an example), or functionally equivalent procedure acceptable to the CPM, to document and respond to each noise complaint;
19. attempt to contact the person(s) making the noise complaint within 24 hours;
20. conduct an investigation to determine the source of noise related to the complaint;
21. take all feasible measures to reduce the noise at its source if the noise is project related, and
22. submit a report documenting the complaint and the actions taken. The report shall include: a complaint summary, including results of noise reduction efforts; and if obtainable, a signed statement by the complainant, stating that the noise problem is resolved to complainant's satisfaction.

**Verification:** Within 30 days of receiving a noise complaint, the project owner shall file a copy of the Noise Complaint Resolution Form, or similar instrument approved by the CPM, with Kern County and with the CPM documenting the resolution of the complaint. If mitigation is required to resolve a complaint, and the complaint is not resolved within a 30-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is finally implemented.

**NOISE-3** Prior to the start of rough grading, the project owner shall submit to the CPM for review a noise control program. The noise control program shall be used to reduce employee exposure to high noise levels during construction and also to comply with applicable OSHA standards.

**Verification:** At least 30 days prior to the start of rough grading, the project owner shall submit to the CPM the above referenced program. The project owner shall make the program available to OSHA upon OSHA's request.

**NOISE-4** The noise mitigation measures to be employed by the project owner may include (but not be limited to):

23. Provide standard outdoor/weather enclosures for the combustion turbine generator packages.
24. Provide air inlet silencers for the combustion turbines.

**Verification:** Within 30 days of completing the design of the noise mitigation measures, the project owner shall transmit the noise mitigation measures to the EHPP and the CPM.

**NOISE-5** The project owner shall conduct an occupational noise survey to identify the noise hazardous areas in the facility. The survey shall be conducted within thirty (30) days after the facility is operating at an output of 80% of rated capacity or greater, and shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations sections 5095-5100 (Article 105) and Title 29, Code of Federal Regulations, Part 1910. The survey results shall be used to determine the magnitude of employee noise exposure. The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures that will be employed to comply with the applicable state and federal regulations.

**Verification:** Within 30 days after completing the survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA upon OSHA's request.

**NOISE-6** Noisy construction work (that which causes off-site annoyance, as evidenced by the filing of a legitimate noise complaint) shall be restricted to the hours of: 7 a.m. to 7 p.m. on weekdays and from 8 a.m. to 6 p.m. on weekends and holidays.

**Verification:** The project owner shall transmit to the CPM in the first Monthly Construction Report a statement certifying that the above restrictions will be observed throughout the construction of the project.

## NOISE COMPLAINT RESOLUTION FORM

Elk Hills Power Project  
(99-AFC-1)

**NOISE COMPLAINT LOG NUMBER** \_\_\_\_\_

Complainant's name and address:

Phone number: \_\_\_\_\_

Date complaint received: \_\_\_\_\_

Time complaint received: \_\_\_\_\_

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: \_\_\_\_\_

Initial noise levels at 3 feet from noise source \_\_\_\_\_ dBA      Date: \_\_\_\_\_

Initial noise levels at complainant's property: \_\_\_\_\_ dBA      Date: \_\_\_\_\_

Final noise levels at 3 feet from noise source: \_\_\_\_\_ dBA      Date: \_\_\_\_\_

Final noise levels at complainant's property: \_\_\_\_\_ dBA      Date: \_\_\_\_\_

Description of corrective measures taken:

Complainant's signature: \_\_\_\_\_ Date: \_\_\_\_\_

Approximate installed cost of corrective measures: \$ \_\_\_\_\_

Date installation completed: \_\_\_\_\_

Date first letter sent to complainant: \_\_\_\_\_ (copy attached)

Date final letter sent to complainant: \_\_\_\_\_ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: \_\_\_\_\_

(Attach additional pages and supporting documentation, as required).



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## NOISE: APPENDIX A

### FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

Noise levels can be measured in a number of ways. One common measurement, the equivalent sound level ( $L_{eq}$ ), is the long-term A-weighted sound level that is equal to the level of a steady-state condition having the same energy as the time-varying noise, for a given situation and time period. (See NOISE: Table A1, below.) A day-night ( $L_{dn}$ ) sound level measurement is similar to  $L_{eq}$ , but has a 10 dB weighting added to the night portion of the noise because noise during night time hours is considered more annoying than the same noise during the day.

<b>NOISE Table A1</b> <b>Definition of Some Technical Terms Related to Noise</b>	
Terms	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dB	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
$L_{10}$ , $L_{50}$ , & $L_{90}$	The A-weighted noise levels that are exceeded 10%, 50%, and 90% of the time, respectively, during the measurement period. $L_{90}$ is generally taken as the background noise level.
Equivalent Noise Level $L_{eq}$	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels to levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, $L_{dn}$	The Average A-Weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location.
Intrusive Noise	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Source: California Department of Health Services 1976.	

In order to help the reader understand the concept of noise in decibels (dBA), NOISE: Table A2 has been provided to illustrate common noises and their associated dBA levels.

<b>NOISE Table A2 Typical Environmental and Industry Sound Levels</b>			
Source and Given Distance from that Source	A-Weighted Sound Level in Decibels (dBA)	Environmental Noise	Subjectivity/ Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		
Very Loud Music	110	Rock Music Concert	Very Loud
Pile Driver (50')	100		Very Loud
Ambulance Siren (100')	90	Boiler Room	Very Loud
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	Quiet
Large Transformer (200')	40		
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
Source: Peterson and Gross 1974			

### ***SUBJECTIVE RESPONSE TO NOISE***

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of

annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise levels, knowledge of the following relationships (Kryter 1970) can be helpful in understanding the significance of human exposure to noise.

25. Except under special conditions, a change in sound level of one dB cannot be perceived.
26. Outside of the laboratory, a 3-dB change is considered a barely noticeable difference.
27. A change in level of at least five dB is required before any noticeable change in community response would be expected.
28. A 10-dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

### **COMBINATION OF SOUND LEVELS**

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a three dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus three dB). The rules for decibel addition used in community noise prediction are:

<b>NOISE Table A3</b> <b>Addition of Decibel Values</b>	
When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to $\pm 1$ dB.	

Source: Thumann, Table 2.3

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

**NOISE Table A4**  
**OSHA Worker Noise Exposure Standards**

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: OSHA Regulation

**RELATIONSHIPS**

$$L_{dn} = 10 \log (1/24)[15 \times 10^{(L_d/10)} + 9 \times 10^{(L_n+10)/10}]$$

Note: the 10-dB weighting added to the nighttime noise level. Daytime and nighttime are 15 hours (0700~2200 hrs) and 9 hours (2200~0700 hrs) respectively.  $L_d$  and  $L_n$  are the  $L_{eq}$  values over the 15 and 9 hours respectively.  $L_{dn}$  does not contain any consideration for tonal sounds, since it is derived from  $L_{eq}$  measurements.

CNEL is essentially the same as  $L_{dn}$ , except that different time segments are used in computation. The 24-hour period is divided into three segments instead of two. The day period (0700~1900 hours), evening (1900~2200 hours) and night (2200~0700 hours). The evening period is assigned 5-dB weighting and the nighttime is assigned 10-dB weighting. The extra 5 dB weighting during the evening results in higher values for CNEL than  $L_{dn}$ , but the difference is not statistically significant.

**NOISE ATTENUATION**

$$[L_p] \text{ (at } x = r) = [L_p] \text{ (at } r = y) - 20 \log(x/y).$$

Where:  $x$  = distance to point where noise level is to be determined.  
 $y$  = reference point.

$$\Delta_{Loss} = 20 \log (x/y).$$

Special case where  $x = 2y$

$$\Delta_{Loss} = 20 \log (2y/y). = 20 \log (2) = 6$$

$\therefore$  As we double the distance, from a point source in free space, the noise level decreases by 6 dB.

# VISUAL RESOURCES

Testimony of David Flores

## INTRODUCTION

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Energy Commission staff analyzed both the potential visual impacts of the proposed Elk Hills Power Project (EHPP) and the compliance of the project with applicable laws, ordinances, regulations, and standards. Staff concludes that the project may cause significant adverse visual impacts in the area of Key Observation Points 3 and 5 that are views of the proposed electrical transmission lines. These significant adverse visual impacts will be mitigated to less than significant levels by implementation of mitigation measures (light reflectors and color treatment at power plant and color treatment of power poles) identified in this analysis. Also, the project after mitigation would not conflict with local policies regarding visual resources that are part of the applicable laws, ordinances, regulations, and standards. **VISUAL RESOURCES Table 2** provides an overall summary of staff's conclusion based on consideration of each Key Observation Point analyzed and the resultant values for visual impacts.

## PURPOSE

Visual resources are the natural and cultural features of the environment that can be viewed. This analysis focuses on whether the EHPP would cause significant adverse visual impacts and whether the project would be in conformance with applicable laws, ordinances, regulations, and standards. The determination of the potential for significant impacts to visual resources resulting from the proposed project is required by the California Environmental Quality Act (CEQA) Public Resources Code section 21000 et seq. and Title 20, California Code of Regulations, section 1701 et seq.<sup>1</sup>. The determination of the conformance of the proposed project with applicable laws, ordinances, regulations, and standards is required by Public Resources Code, section 25525.

## ORGANIZATION OF ANALYSIS

This analysis is organized as follows:

- describes staff's analysis methodology;
- describes applicable laws, ordinances, regulations and standards;
- assesses the visual setting of the proposed power plant site, including linear facility routes;
- evaluates the visual impacts of the proposed project on the existing setting;
- evaluates compliance of the project with applicable laws, ordinances, regulations, and standards; and

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<sup>1</sup> The California Energy Commission's power plant siting regulations.

- recommends measures needed to mitigate any potential significant adverse visual impacts of the proposed project and to achieve compliance with applicable laws, ordinances, regulations, and standards.

## **METHODOLOGY**

The methodology used in this visual assessment is described below and includes a description of the approach and process used, identification of the criteria used for visual assessment, and identification of the basis for identifying relevant significance criteria used in evaluating the impacts of the proposed project.

### ***SIGNIFICANCE CRITERIA***

Energy Commission staff considered the following criteria in determining whether a visual impact would be significant.

#### **STATE**

The CEQA Guidelines defines a “significant effect” on the environment to mean a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance. (Cal. Code Regs., tit.14, § 15382.)

Appendix G of the Guidelines, under Aesthetics, includes four questions to be addressed regarding whether the potential impacts of a project are significant. These questions ask whether the project would:

- a) have a substantial adverse effect on a scenic vista;
- b) substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- c) substantially degrade the existing visual character or quality of the site and its surroundings; or
- d) create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

#### **LOCAL**

Energy Commission staff considers any local goals, policies or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts. See the section on Applicable Laws, Ordinances, Regulations, and Standards.

#### **PROFESSIONAL STANDARDS**

Professionals in visual impact analysis have developed a number of questions as a means of evaluating the potential significance of visual impacts (see, e.g., Smardon 1986). The questions listed below address issues commonly raised in visual analyses for energy facilities:



- Will the project substantially alter the existing viewshed, including any changes in natural terrain?
- Will the project deviate substantially from the form, line, color, and texture of existing elements of the viewshed that contribute to visual quality?
- Will the project eliminate or block views of valuable visual resources?
- Will the project result in significant amounts of backscatter light into the nighttime sky?
- Will the project be in conflict with directly identified public preferences regarding visual resources?
- Will the project result in a significant reduction of sunlight, or the introduction of shadows, in areas used extensively by the community?
- Will the project result in a substantial visible exhaust plume?

### **KEY OBSERVATION POINTS**

Energy Commission staff selected Key Observation Points<sup>2</sup>(KOPs) to provide the basis for evaluation of project impacts by comparing the appearance before and after project construction. KOPs include locations that are chosen to be representative of the most critical locations from which the project would be seen.

### **EVALUATION PROCESS**

For each KOP, Energy Commission staff considered the existing visual setting and the visual changes that the project would cause to determine impact significance. The applicant used Viewing Positions in the visual resources section of the application (EHPP 1999a). Energy Commission staff evaluated the appropriateness of these locations for its analysis and agreed with the selection of locations.

### **ELEMENTS OF THE VISUAL SETTING**

To assess the existing visual setting, staff considered the following four elements:

Visual Quality - The value of visual resources. This analysis used an approach that considers visual quality as ranging from outstanding to low. Outstanding visual quality is a rating reserved for landscapes that would be what a viewer might think of as “picture postcard” landscapes. “Low visual quality describes landscapes that are often dominated by visually discordant human alterations, and do not provide views that people would find inviting or interesting” (Buhyoff et al., 1994). For projects in an urban setting , visual quality typically ranges from high, such as for a park or major water view, to low, such as for an area of heavy industry.

Visual Sensitivity - A measurement of the level of interest or concern of viewers regarding the visual resources in an area. Official statements of public values and goals reflect viewers’ expectations regarding a visual setting. This analysis also employed land use as an indicator of viewer sensitivity. Uses associated with 1)

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<sup>2</sup> The use of KOPs or similar view locations is common in visual resource analysis. The US Bureau of Land Management and the US Forest Service use such an approach.

designated parks, monuments, and wilderness areas, 2) scenic highways and corridors, 3) recreational areas, and 4) residential areas are highly sensitive. Commercial uses, including business parks, are generally moderately sensitive, with landscaping, building height limitations, and prohibition of above-ground utility lines demonstrating concern for visual quality. Large scale industrial uses are typically the least sensitive because workers are focused on their work, and generally are working in surroundings with relatively low visual value.

Visibility - Visibility can differ substantially between view locations, depending on screening and the angle of view. The smaller the degree of screening, the higher a feature's visibility is. The closer the feature is to the center of the view area, the greater its visibility.

Viewer Exposure - The degree to which viewers are exposed to a view is affected by distance, the number of viewers, and the duration of view. Viewer exposure can range from having high values for all three factors, such as a foreground view from a large number of residences, to having low values for all three factors, such as a brief background view for a few travelers.

#### TYPES OF VISUAL CHANGE

To assess the visual changes the project would cause, staff considered the following factors:

Dominance - One measure of change is *scale dominance* - the apparent size of an object relative to the visible expanse of the landscape and to the total field of view. Another measure of change is *spatial dominance* - the measure of the dominance of an object due to its location in the landscape. Dominance can range from subordinate to dominant.

Contrast – Visual contrast was evaluated in regard to the elements of color, form, line, and scale.<sup>3</sup> The degree of contrast can range from high to low.

View Blockage – View blockage is the blockage from view or elimination by the project of any previously visible components. Blockage of higher quality visual elements by lower quality elements causes adverse impacts. The degree of view blockage can range from strong to none.

## LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

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### FEDERAL AND STATE

The proposed project, including the linear facilities, is located on private lands and is thus not subject to federal land management requirements. Likewise, no roadway in the project vicinity is a designated or eligible State Scenic Highway. Therefore, no federal or state regulations pertaining to scenic resources are applicable to the project

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<sup>3</sup> Scale contrast is the scale of an object relative to other distinct objects or areas in the landscape.

## **LOCAL**

### **COUNTY OF KERN**

#### **GENERAL PLAN**

Kern County has no specific policies on visual or aesthetic resources that apply to the Elk Hills project. However, these issues are addressed in the Kern County General Plan, Open Space Element, and are implemented by the Kern County Planning and Development Services Department (Kern County, 1994). This element of the General Plan requires public notification and review of any projects that may adversely impact visual resources. In accordance with Chapter 19.86 of the Kern County Zoning Code, the applicant is required to prepare a Landscape Plan when final construction drawings of the project are completed. Staff has addressed this requirement under the Condition of Certification section (**VIS-5**) of this analysis. The Elk Hills project is generally consistent with the land use designation for the area, and therefore is considered consistent with associated visual resource planning purposes and General Plan requirements.

## **PROJECT DESCRIPTION**

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The proposed EHPP will be a nominal 500-megawatt (MW), natural gas-fired combined cycle power plant located in the Elk Hills region of western Kern County. The site is about 25 miles west of Bakersfield, California, 9 miles south of the unincorporated community of Buttonwillow, California, and 9 miles north of Taft, California. The 12 acre site is a part of the 47,000 acre Elk Hills Oil and Gas Field operated by Occidental of Elk Hills Inc. (OEHI), formerly the Elk Hills Naval Petroleum Reserve. The site is currently occupied by out-of-service tanks and related equipment formerly used for the storage and loading of propane, butane, and natural gas liquid products.

## **WATER SUPPLY LINE**

A 16-inch, 9.8-mile long cooling water supply pipeline will be installed from the plant site to the West Kern County Water District distribution facility adjacent to the California Aqueduct's intersection with state Highway 119. The water pipeline will be above ground from the power plant site to milepoint (MP) 5.7. The waterline will be placed on pipe supports spaced at intervals of approximately 50 feet. The water pipeline will be underground from MP 5.7 to its termination at the West Kern County Water District distribution facility (MP 9.8).

## **NATURAL GAS PIPELINE**

A new gas pipeline will not be required, as locally produced natural gas is available on site. The facility intertie to the existing pipeline will be 2,500 feet in length. This facility intertie will also provide access to the Mojave Gas Pipeline to the west and to a Pacific Gas and Electric Company pipeline to the east.

## **WASTEWATER PIPELINE**

The 6-inch wastewater pipeline will be carried above ground and placed on 6-inch high concrete sleepers spaced at intervals of approximately 25 feet. The wastewater will be disposed of in injection wells to be drilled adjacent to Elk Hills Road at the edge of Buena Vista Valley. The wastewater pipeline will be located entirely within the Elk Hills Oil and Gas Field.

## **TRANSMISSION LINE**

Transmission line Route 1A would be 9 miles long and would terminate at a new substation located on the west side of the California Aqueduct near the community of Tupman. The substation would connect with the existing 230 kV Midway-Wheeler Ridge transmission line. Route 1B would parallel the existing 115 kV Midway-Taft transmission line and would interconnect at the Midway Substation at Buttonwillow.

With the recent variation by EHPP to relocate a portion Alternate Route 1B from the plant site to the Midway Substation, staff has reviewed the proposed linear route (Route 1B) and determined that the linear facilities will not adversely effect views significantly. Staff has provided mitigation (Staff Mitigation 1) which insures painting of the transmission poles to a color consistent with the surrounding area.

## **SETTING**

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### **REGIONAL SETTING**

The project site lies about 25 miles west of Bakersfield along the southwestern edge of the San Joaquin Valley. The landscape includes the Elk Hills and portions of the flat valley lands to the north. The Elk Hills are a 16-mile long, 6-mile wide southeast trending foothill spur of the Temblor range. The ridges of the Elk Hills rise 1,000 to 1,200 feet above the floor of the adjacent San Joaquin Valley. The climate is arid, and the hills are covered with a mantle of low growing annual grasses. Elk Hills has been subject to intensive oil and gas exploration since the early part of the 20<sup>th</sup> century, and the natural landscape has been modified extensively. A network of access roads, terraced drilling areas, oil pumps, above ground pipelines, and storage tanks crisscrosses the hills in the area of the project site. Oil and gas processing facilities are all prominently visible within the landscape pattern. Most of the Elk Hills Oil and Gas Field lands have been fenced off during the time it was a Naval Petroleum Reserve and public access restricted, and these public access restrictions have been continued by Occidental of Elk Hills, Inc. (OEHI). The only part of the area open to public use is Elk Hills Road, a county highway that passes north/south across the center of the range. This road provides the only close up views of the landscape of the Elk Hills.

As provided in the Application for Certification, the small number of residences scattered through this area tend to be farm homes rather than non-farm rural residences, and residential uses are secondary to this area's agricultural function.

The landscape consists of roads, canals, power lines, agricultural storage facilities are very prominent and little natural vegetation and landscaping is visible.

Communities in the project area include Dustin Acres, Valley Acres, Tupman, and Buttonwillow. Dustin Acres and Valley Acres are small unincorporated residential communities located along Highway 119 in the Buena Vista Valley, which lies along the southern edge of the Elk Hills range. Tupman is a small, unincorporated residential community located in the eastern end of the Elk Hills at the base of its northern slopes.

Buttonwillow is an unincorporated community located on the flat lands approximately four miles north of the northern edge of the Elk Hills range. Buttonwillow is the largest of the communities in the project area and consist of residential homes and commercial service centers for the surrounding agricultural operations in the area.

The Tule Elk State Reserve (Reserve) is located north of the Elk Hills range on the flat valley lands northeast of Tupman. The reserve is a 956-acre sanctuary for the Tule or dwarf elk. The facilities consist of a visitor's center, picnic grounds, and viewing area, located at the Reserve's north end along Station Road.

The proposed power plant will be visible from the Reserve. As indicated in the AFC Figure 5.10-1, portions of the transmission line along Route 1A would be visible from the visitor center and viewing platform at the Reserve. However, given the distance (2.5 miles) and the fact the transmission line would be viewed against the backdrop of the hills, the line would not be highly visible, and would be a minor element in the overall landscape scene. Also given the distance the transmission line would have little effect on the character and quality of the scenery experienced by visitors to the reserve. Therefore, staff has not addressed the Tule Elk State Reserve in the visual analysis section of this report.

## **PROJECT AREA SETTING**

The project site will be located on a 12-acre parcel located on a large, generally flat plateau on the crest of the Elk Hills range. The site lies on the west side of Elk Hills Road (county) near the intersection of Skyline Road (private) within a complex of gas processing facilities operated by OEH. In addition to the gas processing facilities, this complex also includes a cogeneration plant, a liquidified petroleum gas storage and loading facility, a maintenance facility, and a single story administration building. Much of the land has been graded. Some of the graded areas have been paved, but much of the graded areas have been left with either dirt or gravel surfaces. The only vegetation consists of low-growing annual grasses. The area on which the plant will be developed is an area that was occupied by a cluster of large out of service, spherical-shaped tanks and a row of fourteen, large out-of-service bullet tanks, which will be removed from the site prior to construction.

## **KEY OBSERVATION POINTS**

As provided in the AFC (AFC pg. 5.10-5, Section 5.10.1.6), the consultant structured the analysis of the project effects by identifying the view areas most

sensitive to the project's potential visual impacts, and in consultation with Energy Commission staff, five Observation Points (KOPs) were selected for the development of photo simulations that could be used as a basis for visualizing the plant's potential effects. This analysis focuses on viewers who are highly sensitive to changes in the visual setting and on existing visual features that affect the visual quality, visibility, and visual exposure to the proposed project for those viewers.

**VISUAL RESOURCES Figure 1** shows the location of the KOPs used in this analysis and the direction of each view.

Because the water supply and wastewater lines will be either underground or on the ground and will be either not visible or not highly visible, and because they will, for the most part be located within the 74 square mile boundaries of the Elk Hills Oil and Gas Field to which public access is restricted, KOPs were not identified or defined for these features.

**VISUAL RESOURCES Table 2** shows the value for visual quality, viewer sensitivity, visibility, and viewer exposure considered for each of the Key Observation Points analyzed in this section and the resultant values for visual impacts. Table 2 also serves an overall summary of staff's analysis for this section:

**VISUAL RESOURCES Figure 1**  
**Key Observation Points**

**VISUAL RESOURCES Table 2**  
**Summary of Visual Impact Susceptibility - Key Observation Points**

	VISUAL QUALITY	VIEWER SENSITIVITY	VISIBILITY	VIEWER EXPOSURE
Key Observation Point 1	Low	Low	Moderate	Moderate
Key Observation Point 2	Low to Moderate	Low	Moderate	Moderate
Key Observation Point 3	Moderate	Moderate	Moderate to High	Moderate to High
Key Observation Point 4	Low to Moderate	Low	Low to Moderate	Moderate
Key Observation Point 5	Moderate	Moderate	Moderate to High	Moderate

**KEY OBSERVATION POINT 1 – POWER PLANT**

KOP 1(see **VISUAL RESOURCES Figure 1** for location) represents the view toward the site from Elk Hills Road in the plateau area. The KOP is located on the east side of the road. At a point approximately 1,100 feet south of the Elk Hills Road intersection with Skyline Road, a private road that provides restricted access to the Elk Hills Oil and Gas Field.

**Visibility**

Approximately 900 vehicles per day travel on Elk Hills Road. From a visibility standpoint, the plant will be seen in the foreground and middleground views from Elk Hills Road; at its closest point, the plant site will be within 600 feet of the road.

**Visual Quality**

The view of KOP 1 has the character of an arid, open landscape devoted to oil and gas production and gas processing facilities. Wooded power poles, oil pumps, surface pipelines, tanks, portable buildings, and heavy equipment are elements of the landscape scene. Because industry characterizes these views and no features of higher quality are present, visual quality in this view is low.

**Viewer Exposure**

Approximately 900 vehicles per day travel on Elk Hills Road. For travelers on Elk Hills Road, considering the foreground distance and the small number of viewers, the viewer exposure is moderate.



#### **KEY OBSERVATION POINT 2- ELK HILLS ROAD**

KOP 2 (see **VISUAL RESOURCES Figure 2** for location) represents the view of the new transmission line from Elk Hills Road in the area north of the proposed plant.

##### ***Visibility***

The traveling public can see the proposed transmission line on Elk Hills Road at a rate of approximately 900 vehicles per day. As provided in the AFC, the transmission line will be part of a view in which the line and poles will be in the center of road users' cone of vision. The KOP is located on Elk Hills Road, approximately 800 feet north of where the existing 115 kV line crosses the road and approximately 1,550 feet north of where the proposed line will cross.

##### ***Visual Quality***

The view from KOP 2 includes the road, the road cut, and the existing PG&E 115 kV lines 105-foot steel lattice poles. The landscape visible in this view is disturbed by the patterns in the grass on the hillsides indicating the presence of access roads related to oil and gas production activities. Because the landscape visible from KOP 2 is disturbed, the visual quality is low to moderate.

##### ***Viewer Exposure***

Considering the foreground distance, the small number of viewers (900 vehicles per day) and the moderate duration of view, viewer exposure is moderate for Key Observation Point 2.

#### **KEY OBSERVATION POINT 3- TRANSMISSION LINE-COMMUNITY OF TUPMAN**

KOP 3 (see **VISUAL RESOURCES Figure 3** for location) represents the eastern view of a portion of the transmission line alternative Route 1A that will be most visible from the community of Tupman, an unincorporated community with fewer than 100 residents.

##### ***Visibility***

The transmission line will be visible from up to 18 homes at the periphery of the community that have unobstructed views towards the route's alignment. The transmission line will also be visible from the Elk Hills Elementary School grounds and the adjacent God's Oasis Church, which are located on the western edge of the community. Visibility is considered moderate to high.

##### ***Visual Quality***

The view from KOP 3 is toward the southwest that takes in a part of the school gymnasium, a portion of the school grounds, and existing distribution line that will be partially paralleled by the proposed transmission line. The school gymnasium is 33 feet high and the height of the existing distribution line wood poles is 43 feet. Because the view includes existing structures such as the school, church building, and an existing transmission line, visual quality is moderate.

### ***Visual Exposure***

The two proposed transmission poles are in the middleground from this KOP. The number of viewers is moderate, and the view duration is long. Therefore, viewer exposure is moderate to high.

#### **KEY OBSERVATION POINT 4- TRANSMISSION LINE- EAST OF TUPMAN**

KOP 4 (see **VISUAL RESOURCES Figure 4** for location) represents the view east of Tupman as the alignment of the transmission line alternative Route 1A crosses Tupman Road and travels across the open grasslands to the east where it terminates at the proposed substation.

### ***Visibility***

The transmission line will be visible to a handful of homes at the most easterly edge of the community of Tupman. The transmission line will also be visible to approximately 360 vehicles per day on Tupman Road. Visibility is considered low to moderate.

### ***Visual Quality***

The view from KOP 4 is panoramic across the valley. The terrain in this area is flat to slightly rolling. The vegetation is low grasses and the view is unobstructed. Existing wooden electrical distribution lines (37 feet high) are in the foreground. Visual quality is considered low to moderate for KOP 4.

### ***Visual Exposure***

Considering the middle-ground distance from the KOP to the proposed transmission line, the small number of viewers, and the moderate duration of view, visual exposure for KOP 4 is moderate.

#### **KEY OBSERVATION POINT 5- WASCO WAY TRANSMISSION LINE**

KOP 5 (see **VISUAL RESOURCES Figure 5** for location) represents the alignment of the transmission line alternative Route 1B which follows along the east edge of Wasco Way, where it lies within the immediate foreground of the road.

### ***Visibility***

The corridor along Wasco Way includes scattered rural residences. On the west side of the road, there are two residences and a 10-unit agricultural labor housing complex. On the east side of the road, adjacent to the proposed alignment, there are five residences; in addition, there is also a residence on Beurkle Road just east of Wasco Way in close proximity to the alignment. Because of the presence of rural residence, visibility is considered moderate to high.

### ***Visual Quality***

The view from KOP 5 is northward that takes in the existing electrical distribution line carried on 32-foot high wood poles. In addition the view takes in the 71-foot high concrete poles carrying the PG&E 115 kV transmission line. Portions of the agricultural field that border the road and homes on both sides of the road are

shown from this viewpoint. Because of the presence of rural residences, existing distribution lines and agricultural landscaping, visual quality is considered moderate.

#### ***Visual Exposure***

Considering the foreground distance of the proposed electrical distribution line from the existing residences, the small number of viewers (approximately 900 vehicles per day and scattered rural residences), viewer exposure is moderate and view duration is long. Considering these factors, viewer exposure is moderate for Key Observation Point 5.

## **IMPACTS**

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### ***CONSTRUCTION IMPACTS***

#### ***PROJECT SITE***

The period of construction for the main site and offsite utility installation is expected to take about 15 months and would entail heavy construction equipment, temporary office facilities, laydown and storage area, and truck traffic. The power plant site is sufficiently far from residences that visual impacts due to construction would not be significant.

#### ***ELECTRICAL TRANSMISSION LINES***

Construction activities for the transmission lines would involve drilling holes for tower foundations, installation of the foundation reinforcement and structure anchoring equipment, the placement of concrete for foundations, the installation of the structures, and the two transition stations.

Construction of the transmission line and transition stations would take approximately three months to complete and would occur within the overall timeframe for the construction activities at the power plant site.

#### **NATURAL GAS LINES, WATER SUPPLY AND WASTEWATER PIPELINES**

A 10-inch diameter pipeline that will extend a short (2,500 feet) distance from an existing 20-inch pipeline will provide natural gas. Although the pipeline will lie on top of the ground, because it will be located behind the plant as viewed from Elk Hills Road, it will not be prominently visible from publicly accessible areas. Visual impacts during construction would not be significant.

A new 16-inch diameter steel water pipeline will lie within an established right of way and adjacent to an existing line. Like the existing line it parallels, the water line will be above ground in the area between the power plant and MP 5.7, and underground between MP 5.7 and its point of origin at the West Kern Water District distribution facility adjacent to the California Aqueduct at Highway 119. The above ground portion of the water line will lie entirely within the Elk Hills Oil and Gas Field and will only be visible to the public from a small area along Elk Hills Road. From

staff's perspective, the pipeline will be seen in the context of the existing oil and gas facilities and would not produce a significant change in visual conditions.

The wastewater line will be a 6-inch steel pipeline and will be located above ground. For most of its length, the pipeline will parallel an existing above ground pipeline. The proposed 6-inch pipeline will parallel Elk Hills Road and may be visible from it in various areas. Because of the pipeline size and its general consistency with other features in this landscape, it will not have a significant effect on the visual quality of the landscape through the area it passes.

## **OPERATIONS IMPACTS**

### ***KEY OBSERVATION POINT 1***

**Visual Resources** **Figure 1b** shows the view from KOP 1 with the proposed project simulated in the view. As shown, the plant will be clearly visible from Elk Hills Road and will add a new element to the view. From the perspective of form, line, color, texture, scale dominance, and spatial dominance, because of its location, and general consistency with the existing oil and gas processing facility adjacent to the project site, the project will not appreciably change the character and quality of the landscape visible from the road. It can be concluded that the proposed plant will not have a significant impact based on the following summarization of visual factors for KOP 1:

- viewer sensitivity is low;
- visual quality is low for the traveling public with views of the project generally seen by the local oil workers in the area;
- visibility is moderate;
- viewer exposure is moderate;
- the highest levels of contrast would be moderate;
- scale dominance would be negligible;
- spatial dominance would be co-dominant with the existing gas processing and cogeneration facility adjacent to the proposed power plant facility; and
- view blockage would be negligible.

Considering all of these factors, the visual impact would be less than significant from the view area represented by KOP 1.

### ***KEY OBSERVATION POINT 2***

**Visual Resources** **Figure 2B** shows the view from KOP 2 as one of the proposed transmission line's poles will be visible within the cone of vision of travelers (approximately 900 vehicles per day) on Elk Hills Road. From this KOP, the new transmission line will appear slightly smaller than the existing PG&E 115 kV line located in the foreground. The transmission line will increase the density of transmission poles visible from this KOP, but will not substantially change the quality of view. It can be concluded that the proposed transmission lines in this

area will not have a significant impact based on the following summarization of visual factors for KOP 2:

- viewer sensitivity is low;
- visual quality in this area is low to moderate for the traveling public with views of the transmission line;
- visibility is moderate;
- viewer exposure is moderate as the view generally will be seen by local oil workers in the area;
- the highest levels of contrast would be low;
- scale dominance would be negligible;
- spatial dominance would be co-dominant with the existing transmission lines in the area; and
- view blockage would be negligible.

Considering all these factors, visual impact would be less than significant from the view area represented from KOP 2.

### ***KEY OBSERVATION POINT 3***

**Visual Resources** Figure 3B shows the view from KOP 3 as it represents the proposed Transmission Line Alternative 1A as viewed from the area across the street from the Elk Hills School and God's Oasis Church in the community of Tupman.

#### **CONTRAST WITH STRUCTURES**

From Key Observation Point 3, the most prominent existing structures are the 43-foot high wood electrical distribution poles in the foreground. From this view, the nearest proposed 120-foot high transmission line would be approximately 1,000 feet from the nearest structures (school and church building). The proposed transmission poles will be in the middleground and will appear slightly taller than the existing distribution poles. The form and line of the proposed poles would be similar to the existing poles. The poles also would be galvanized steel and will be colored to match the color and texture with the existing poles. In summary, the proposed poles would cause moderate contrast in form, line, color, texture, and scale.

#### ***Contrast with Vegetation***

Vegetation visible in the view from Key Observation Point 3 consist of a variety of seasonal grasses and low shrubs. The vertical form of the poles would contrast highly to the low, irregular form of the natural arid vegetation. The straight lines of the poles would similarly contrast with the existing vegetation. The color tones of the poles would contrast moderately with the texture of the vegetation. The towers would be substantially larger than any of the vegetation, so scale contrast would be high. However, the proposed transmission line would only add incrementally to the contrast with vegetation caused by the existing poles, which are closer to the school and church buildings, so contrast with vegetation would be low.

### ***Contrast with Land/Water***

No water is visible in this view. The landforms consists of flat natural land with the Elk Hills visible in the horizon. The proposed transmission poles would contrast highly with this land surface in regard to form and line. The earth tone colors of the transmission line would cause moderate contrast with the natural terrain of the landforms of this viewpoint. The flat texture of the poles would cause moderate contrast with the texture of the land. The existing school gymnasium in the foreground would compliment the transmission lines in the background, so scale contrast would be moderate.

### ***Scale Dominance***

The group of proposed transmission poles visible from this viewpoint would be moderate in size compared to the panoramic field of view and would occupy a moderate part of the setting. Therefore, scale dominance from Key Observation Point 3 would be co-dominant.

### ***Spatial Dominance***

Because the spatial composition of the view from Key Observation Point 3 is panoramic, the towers would be subordinate in regard to composition. Spatial dominance would be prominent in regard to position. Because the transmission poles would be almost backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant, similar to the existing poles.

### ***View Blockage***

From Key Observation Point 3, the proposed poles would only block a small portion of the field of vision. Therefore, the amount of view blockage is minimal.

### ***Visual Impact Severity***

Because scale dominance would be co-dominant, the project's visual impact severity from Key Observation Point 3 would be high. (See **VISUAL RESOURCES APPENDIX B-Table B-1**).

## ***KEY OBSERVATION POINT 4***

**Visual Resources Figure 4B** shows the view from KOP 4 as it represents the view toward the transmission line Alternative 1A's crossing of Tupman Road and its termination at a new substation located adjacent to the California Aqueduct. As further shown in the view from KOP 4, there exist wooden utility poles in the foreground and existing lattice steel towers of the Midway-Wheeler Ridge 230Kv line are visible in the middleground. The proposed transmission line will be prominently visible in this view and will have a small degree of impact on the visual character and quality of the view due to the existence of the existing linear facilities in the area. Residential viewers are ½ mile or more from the new transmission line and substation. The distance will significantly reduce the apparent size of the transmission line. It can be concluded that the proposed transmission lines in this area will not have a significant impact based on the following summarization of visual factors for KOP 4:

- visual sensitivity is low;
- visual quality is low to moderate for the traveling public with views of the transmission line as the view generally will be seen by local oil workers in the area;
- visibility is low to moderate;
- viewer exposure is moderate;
- the highest levels of contrast would be low;
- scale dominance would be negligible;
- spatial dominance would be co-dominant; and
- view blockage would be negligible.

Considering all these factors, visual impacts would be less than significant from the view area represented by KOP 4.

### ***KEY OBSERVATION POINT 5***

**Visual Resources** Figure 5B shows the view from KOP 5 as it represents the view from the corner of Wasco Way and Stockdale Highway, looking north along the alignment that the Alternative 1B would follow along the east side of Wasco Way.

#### ***Contrast with Structures***

From Key Observation Point 5, the most prominent existing structures are the 32-foot high wood electrical distribution poles (eastern edge of Wasco Way) and 71-foot high concrete poles that support the PG&E 115 kV line that runs along the western edge of Wasco Way. From this view, the proposed 120-foot high transmission poles will replace the existing 32-foot high wood distribution poles and appear considerably taller than the existing 71-foot high distribution poles. The form and line of the proposed poles would be similar to the existing poles. The poles also would be galvanized steel and will be colored to match the color and texture of the existing poles. There are approximately six rural residential units along Wasco Way. With the removal of the existing 12kV wood pole line and its replacement with the new 120-foot high steel poles, the new transmission line will be more widely spaced and sited to avoid placement of the poles on or near the yards of the homes. In summary, because the power poles which now line both sides of the road, Wasco Way already appears as a well-defined transmission corridor, with the proposed poles causing a moderate contrast in form, line, color, texture, and scale.

#### ***Contrast with Vegetation***

Vegetation visible in the view from Key Observation Point 5 consist of a variety of agricultural row crops. The vertical form of the poles would contrast highly to the low, irregular form of the agricultural fields. The straight lines of the poles would similarly contrast with the existing vegetation. The color tones of the poles would contrast moderately with the texture of the vegetation. The towers would be substantially larger than any of the vegetation, so scale contrast would be high. However, the proposed transmission line would only add incrementally to the

contrast with vegetation caused by the existing poles, which are on the west side of Wasco Way, so contrast with vegetation would be low.

#### ***Contrast with Land/Water***

No water is visible in this view. The landforms consists of flat natural land, planted in various agricultural row crops. The proposed transmission poles would contrast highly with this land surface in regard to form and line. The earth tone colors of the transmission line would cause moderate contrast with the natural terrain of the landforms of this viewpoint. The flat texture of the poles would cause moderate contrast with the texture of the land. The existing transmission line on the west side of Wasco Way would compliment proposed transmission line on the east side of the road, so scale contrast would be moderate.

#### ***Scale Dominance***

The group of proposed transmission poles visible from this viewpoint would be moderate in size compared to the panoramic field of view and would occupy a moderate part of the setting. Therefore, scale dominance from Key Observation Point 5 would be co-dominant.

#### ***Spatial Dominance***

Because the spatial composition of the view from Key Observation Point 5 is panoramic, the towers would be subordinate in regard to composition. Spatial dominance would be prominent in regard to position. Because the transmission poles would be almost backdropped by sky, spatial dominance in regard to backdrop would be prominent. The overall spatial dominance rating would be co-dominant, similar to the existing poles.

#### ***View Blockage***

From Key Observation Point 5, the applicant has indicated their intent to avoid placement of the transmission poles on or near the yards of the homes on the east side of the street or directly across from homes on the west side. With this proposal, residents will see fewer poles in the area in front of their homes. The poles that residents will see in views looking up and down the road will be taller that exist now. Staff agrees with the AFC (AFC pg.5.10-17) that the perceived visual dominance of these taller poles will be reduced by their distance from the homes and by their relationship to the existing PG&E 115 kV line on the opposite side of the road. With the new line, the visible number of conductors crossing the front of properties on the east side of Wasco Way will be increased from 3 to 6, but they will be less noticeable in that they will be higher and more likely out of the normal view plane of nearby viewers. The proposed linear facilities will not block the panoramic view of the agricultural setting, so the proposed poles would only block a small portion of the field of vision. Therefore, the severity of view blockage would be low.

#### ***Visual Impact Severity***

Because scale dominance would be co-dominant, the project's visual impact severity from Key Observation Point 5 would be high. (See **VISUAL RESOURCES APPENDIX B, Table B-1**).



## **LIGHTING**

Although the proposed power plant is in an industrial area, existing lighting levels are generally low in the immediate vicinity. Exterior lighting for the proposed power plant therefore has the potential to considerably increase lighting levels, creating glare, backscatter to the nighttime sky, and illumination of visible plumes. The applicant has proposed measures to reduce such impacts, and Energy Commission staff has expanded these measures in the proposed condition of certification.

## **VISIBLE PLUMES**

### **COOLING TOWER PLUME CHARACTERISTICS**

The potential exists for white vapor plumes (water vapor condensation from the exhaust) to be visible from the project stacks and cooling tower. The frequency, persistence, and size of visible condensate plumes depends primarily on the design and type of combustion turbine generator, heat recovery steam generator, auxiliary boiler, and cooling tower, as well as meteorological conditions of temperature and humidity.

The plume of steam rising from the cooling towers could project upward as much as 1,000 feet from the ground under worst case conditions of temperature and atmospheric conditions.

Although condensate plumes usually tend to dissipate fairly quickly, because of the meteorological conditions in late November, December, and January, such a plume tends to linger and not dissipate as rapidly. However, this is also the foggy season and such plumes will not be visible during much of the time. During the rest of the period when conditions are favorable for steam plume formation, the length of time under which plumes may occur is limited to short periods on any particular day.

### **Viewshed**

The viewshed for the plume is substantially larger than that for the project structures because the plume's maximum height will be much greater than the height of the structures. The tallest proposed structures are the two stacks, proposed to be 120 feet tall. The maximum predicted height of the plume above the cooling towers is over 1,000 feet. The primary area of viewshed is along Elk Hills Road, which is not a heavily traveled public road.

### **Visual Quality**

The cooling tower plume's viewshed includes the McKittrick Valley and the surrounding hills. Portions of the natural landscape have been altered by oil production facilities, so visual quality is low to moderate.

### **Viewer Sensitivity**

Travelers on Elk Hills Road vary in visual sensitivity. Those travelers commuting to and from work in the oil fields are considered to have low visual sensitivity. Other travelers on this roadway are considered to have moderate visual sensitivity because

the area is not known for its scenic value, so few recreational travelers use this roadway.

#### Visibility

Elk Hills Road runs perpendicular to the power plant site, so visibility is low to moderate for travelers.

#### Viewer Exposure

The factors determining viewer exposure are distance, the number of viewers and the duration of exposure. The number of travelers on Elk Hills Road in this area is approximately 900 vehicles per day (EHPP 1998a, PG.5.10-6). Therefore, the number of traveling viewers is low. The duration of view is moderate due to the variable presence and size of the plume and due to the differences in activities between viewers. Although condensate plumes usually tend to dissipate fairly quickly, because of the meteorological conditions in late November, December, and January, such a plume tends to linger and not dissipate as rapidly. However, this is also the foggy season and such plumes will not be visible during much of the time. During the rest of the period when conditions are favorable for steam plume formation, the length of time under which plumes may occur is limited to short periods on any particular day. Considering these limitations, duration of view is low for the traveling public. Maximum duration of view for travelers on Elk Hills Road is between one and two minutes because of hills, and actual duration for these travelers is further restricted by the weather conditions previously discussed. Therefore, expected duration of view for travelers is short. In summary, for the traveling public, the viewing distance is middleground, the number of viewers is low, and the duration of view is very short, so overall visual exposure for travelers is low to moderate.

#### Visual Impact Susceptibility

For travelers on Elk Hills Road, visual quality is low to moderate, visual sensitivity is low to moderate, visibility is low to moderate, and viewer exposure is low to moderate. Considering these factors, for travelers on Elk Hills Road visual impact susceptibility is low to moderate.

#### ***Visual Impact Severity***

#### Contrast

##### *Existing Structures*

The visible cooling tower plume from the proposed project would cause strong contrast to the surrounding existing structures (oil facilities). Color, line and texture contrast of the plume varies dependent on weather conditions in the area. Scale contrast would be high due to the visibility of the semi-rural setting mixed with oil production facilities in the area. An existing gas processing and cogeneration plant are adjacent to the proposed plant with various tanks and oil wells. The highest structures currently on site consist of a 100-foot high distillation column and a 60-foot high cooling tower associated with the Lean Oil Absorption Plant. To the extent of their contrast with the plume, the massive size of the plume contributes highly to the

already diminished quality of the views the area. In summary, during the limited times over the year that the cooling tower plume will occur, it would cause high contrast in regard to form, scale, line, color, and texture.

### *Vegetation*

The visible cooling tower plume from the proposed project considered in relation to vegetation would cause high contrast in regard to the low, rectilinear form of the Elk Hills and natural field grasses in the area. The plume would cause high contrast in regard to the line of the terrain. The white to light gray color of the plume would create high contrast with the seasonally green to tan colors of the vegetation. The plume's soft, irregular texture would contrast moderately to the more distinct but irregular texture of the vegetation. The plume would cause high contrast with the vegetation in regard to scale because it would appear taller than any vegetation when it is visible. In summary, in regard to vegetation, during the limited times over the year that the cooling tower plume would occur, the proposed project would cause high contrast in regard to form, line, color, and scale, and moderate contrast in regard to texture.

### *Land/Sky*

The cooling tower plume would cause high contrast in regard to the form of the land, which consists of flat valley views, some of which have the Elk Hills on the horizon. The plume of steam rising from the cooling towers will occur intermittently.

The plume would cause high contrast in regard to the generally straight line of the horizon and the irregular line of the Elk Hills. The plume would cause high contrast regarding color when the sky is clear and low contrast when the sky is cloudy. The plume would cause moderate contrast with the moderately varied texture of the land. The plume would cause high contrast with the scale of the land, appearing taller than any land feature. In summary, in regard to land/sky, during the limited times over the year that the cooling tower plume would occur, the proposed project would cause high contrast in regard to form, line, color, and scale, and moderate contrast in regard to texture.

### **Scale Dominance**

The cooling tower plume from the proposed project, although it would occur only during limited times of the year, because of its substantial height and width and middle ground distance, it would be a prominent element in the field of view, so the plume would create a co-dominant level of scale dominance.

### **Spatial Dominance**

The cooling tower plume from the proposed project would vary in its location in the view depending on the viewpoint, so its spatial dominance would vary from subordinate to prominent in regard to composition. Because of its middleground location, spatial dominance would be between prominent and subordinate in regard to position. Because the plume would be partially backdropped by sky, spatial dominance in regard to backdrop would be between prominent and subordinate. Overall, spatial dominance would be co-dominant.

## View Blockage

For the traveling public in the viewshed of the plume, during the limited times over the year it would occur, the plume would block a moderate portion of the view of the Elk Hills. Therefore, the severity of view blockage would be moderate.

## Visual Impact Severity

Because a) contrast of the cooling tower plume with existing structures would be high in regard to form, b) contrast with vegetation would be high in regard to form, line, and color, c) contrast with land/sky would be moderate in regard to form, line, and color, d) scale dominance would be co-dominant, and e) spatial dominance would be co-dominant, the cooling tower plume's visual impact severity would be moderate (See **VISUAL RESOURCES Table B-1**).

## Visual Impact

For travelers on Elk Hills Road, visual impact susceptibility is low to moderate and the visual impact severity of the cooling tower plume, during the limited times of the year that it would occur, would be strong, so visual impacts would be less than significant. This also takes into account the limited times per year that the plume would occur, the generally poor weather conditions expected when the plume would occur, and no affected residences in the area.

## CUMULATIVE IMPACTS

The proposed power plant would add a noticeable but not considerable increment to the existing industrial character of this portion of Elk Hills. In regard to the potential for cumulative visual impacts from the proposed Sunrise Cogeneration Power Plant, the proposed La Paloma Power Plant, and the proposed Midway-Sunset Project, almost none of the residential viewers with a view of one of these plants would have a view of the other plants, so the three plants would not cause a cumulative visual impact for local residents. In addition, the viewshed is visually separate by approximately 7 to 8 miles. The transmission line proposed as part of the La Paloma project terminates at the Midway Substation near Buttonwillow, as does Transmission Line 1B for the EHPP. Cumulative impacts at Midway Substation will be insignificant because the two-transmission lines approach the substation from different directions. The Buttonwillow area already has a high density of transmission lines and the incremental impact of the EHPP will be difficult to distinguish from the other transmission lines. In conclusion, the proposed power plant would not contribute substantially to a significant cumulative visual impact.

## FACILITY CLOSURE

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### INTRODUCTION

There are at least three circumstances in which a facility closure can take place, planned closure, unexpected temporary closure and unexpected permanent closure.

## **PLANNED CLOSURE**

Planned closure occurs at the end of a project's life, when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence. The closure plan that the project owner is required to prepare should address removal of the power plant structures and the transmission poles to reduce visual impacts.

## **UNEXPECTED TEMPORARY CLOSURE**

Unexpected temporary closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster, or an emergency. No special conditions regarding visual resources are expected to be required to address temporary closure.

## **UNEXPECTED PERMANENT CLOSURE**

Unexpected permanent closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. The contingency plan that the project owner is required to prepare should address removal of the power plant structures and the transmission poles to reduce visual impacts.

## **COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS AND STANDARDS**

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### **LOCAL**

#### ***COUNTY OF KERN***

The applicant has proposed to prepare a Landscape Plan when final construction drawings of the project are completed. The Landscape Plan is intended to conform to the landscape requirements in Chapter 19.86 of the Kern County Zoning Code. Once available, the applicant will send a copy of the Landscape Plan to the Energy Commission for review. Staff recommends the adoption of a Condition of Certification to ensure that the Landscape Plan and its implementation satisfy the requirements of the Kern County General Plan and Zoning Code.

### **APPLICANT'S PROPOSED MITIGATION**

#### ***SPECIFIC MITIGATION MEASURES***

The Applicant has proposed eight mitigation measures "to make the project more aesthetically acceptable" (EHPP 1998, p.5.10-18):

- All structures, stacks, buildings, and tanks will be constructed of materials that restrict glare, and will be finished with flat, neutral gray tones that will blend with the surrounding environment.
- All fencing will be constructed of non-reflective materials that are non-glare, and will be painted using colors that are unobtrusive.
- Signs at the site will be constructed of non-reflective materials that non-glare, and will be painted using colors that are unobtrusive.
- Lighting at the power plant site will be limited to areas required for safety.

#### Transmission Line:

- In the corridor along the east side of Wasco Way, the transmission poles will be sited so as to avoid locations in or near the front yards of residences located on the east side of the road or directly opposite of residences located on the road's west side.
- At the points where the transmission line would cross major roads, the poles have been sited 100 feet or more from the road's edge to reduce impacts on views from the road.
- The transmission poles and the elements of the substation will be finished with flat neutral gray tones that will blend with the surrounding environment.
- Non-specular conductors and non-reflective and non-refractive insulators will be used to reduce conductor and insulator visibility.

### ***EFFECTIVENESS OF THE APPLICANT'S PROPOSED MITIGATION MEASURES***

The Applicant's proposed mitigation measures will act to reduce the potential significance of visual impacts associated with the generation project. Extensions of these measures and other measures, as proposed below by Energy Commission staff, will ensure that visual impacts will be minimized.

### **STAFF'S PROPOSED ADDITIONAL MITIGATION**

#### ***STAFF MITIGATION 1 (CONDITION 1)***

A specific painting plan is needed to assure that proposed colors will not unduly contrast with the surrounding landscape colors. Such a plan should be submitted at an early time so that any precolored buildings, structures and linear facilities can have colors approved and included in bid specifications for such buildings or structures.

#### ***STAFF MITIGATION 2 (CONDITION 3)***

A specific lighting plan is needed to assure that project lighting will be adequately designed, shielded, and placed so as to minimize off-site light and glare. This plan should also minimize backscatter to the nighttime sky, and should include provisions to minimize lighting of plant areas, consistent with operational and safety needs. A procedure is also needed to resolve any lighting complaints.

### **STAFF MITIGATION 3 (CONDITION 4)**

A specific landscaping plan should be prepared showing the location of such landscaping, the varieties and sizes of plants proposed to be used in such landscaping, and the proposed time to maturity for such landscaping.

## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSIONS**

With application of the proposed mitigation, the visual impacts of the proposed power plant will be less than significant. The use of colors that blend with the existing setting will reduce the potential visual impact of the project structures to a less than significant level. Measures to minimize lighting effects will reduce such impacts to less than significant levels.

As discussed in staff's analysis of condensation plumes, meteorological conditions will determine the severity of the visibility during any given time. In addition, because of the project's rural setting, and lack of residences in the area, staff has determined that periodic and seasonal condensation plumes will have no significant impact.

With the variation by EHPP to relocate a portion Alternate Route 1B from the plant site to the California Aqueduct, staff has reviewed the proposed linear route (Route 1B) and determined that the linear facilities will not adversely effect views significantly. Staff has provided mitigation (Staff Mitigation 1) which insures painting of the transmission poles to a color consistent with the surrounding area.

### **RECOMMENDATION**

The Energy Commission should adopt the following conditions of certification if it approves the project.

## **PROPOSED CONDITIONS OF CERTIFICATION**

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**VIS-1** Prior to the start of commercial operation, the project owner shall treat the project structures, buildings, towers, substation and tanks visible to the public in a non-reflective color to blend with the surroundings. The project owner shall treat the cooling towers with a heat-resistant color that minimizes contrast and harmonizes with the surrounding environment.

Protocol: The project owner shall submit a treatment plan for the project to the California Energy Commission Compliance Project Manager (CPM) for review and approval. The treatment plan shall include:

1. specification, and 11" x 17" color simulations, of the treatment proposed for use on project structures, including structures treated during manufacture;
2. a detailed schedule for completion of the treatment; and,

3. a procedure to ensure proper treatment maintenance for the life of the project.

If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall submit to the CPM a revised plan.

After approval of the plan by the CPM, the project owner shall implement the plan according to the schedule and shall ensure that the treatment is properly maintained for the life of the project.

For any structures that are treated during manufacture, the project owner shall not specify the treatment of such structures to the vendors until the project owner receives notification of approval of the treatment plan by the CPM.

The project owner shall not perform the final treatment on any structures until the project owner receives notification of approval of the treatment plan from the CPM.

The project owner shall notify the CPM within one week after all precolored structures have been erected and all structures to be treated in the field have been treated and the structures are ready for inspection.

**Verification:** Not later than 30 days prior to ordering the first structures that are color treated during manufacture, the project owner shall submit its proposed plan to the CPM for review and approval. If the CPM notifies the project owner that any revisions of the plan are needed before the CPM will approve the plan, within 30 days of receiving that notification, the project owner shall submit to the CPM a revised plan.

Not less than thirty days prior to the start of commercial operation, the project owner shall notify the CPM that all structures treated during manufacture and all structures treated in the field are ready for inspection.

The project owner shall provide a status report regarding treatment maintenance in the Annual Compliance Report.

**VIS-2** Any fencing for the project shall be non-reflective.

**Protocol:** Prior to ordering the fencing the project owner shall submit to the CPM for review and approval the specifications for the fencing documenting that such fencing will be non-reflective.

If the CPM notifies the project owner that revisions of the specifications are needed before the CPM will approve the submittal, the project owner shall submit to the CPM revised specifications.

The project owner shall not order the fencing until the project owner receives approval of the fencing submittal from the CPM.



The project owner shall notify the CPM within one week after the fencing has been installed and is ready for inspection.

**Verification:** At least 30 days prior to ordering the non-reflective fencing, the project owner shall submit the specifications to the CPM for review and approval.

If the CPM notifies the project owner that revisions of the submittal are needed before the CPM will approve the submittal, within 30 days of receiving that notification, the project owner shall prepare and submit to the CPM a revised submittal.

The project owner shall notify the CPM within seven days after completing installation of the fencing that the fencing is ready for inspection.

**VIS-3** Prior to the start of commercial operation, the project owner shall design and install all lighting such that light bulbs and reflectors are not visible from public viewing areas and illumination of the vicinity and the nighttime sky is minimized. To meet these requirements:

**Protocol:** The project owner shall develop and submit a lighting plan for the project to the CPM for review and approval. The lighting plan shall require that:

1. Lighting is designed so that exterior light fixtures are hooded, with lights directed downward or toward the area to be illuminated and so that backscatter to the nighttime sky is minimized. The design of this outdoor lighting shall be such that the luminescence or light source is shielded to prevent light trespass outside the project boundary;
2. High illumination areas not occupied on a continuous basis such as maintenance platforms or the main entrance are provided with switches or motion detectors to light the area only when occupied; and
3. A lighting complaint resolution form (following the general format of that in attachment 1) will be used by plant operations, to record all lighting complaints received and document the resolution of those complaints. All records of lighting complaints shall be kept in the on-site compliance file.

If the CPM notifies the project owner that revisions of the plan are needed before the CPM will approve the plan, the project owner shall prepare and submit to the CPM a revised plan.

Lighting shall not be installed before the plan is approved. The project owner shall notify the CPM when the lighting has been installed and is ready for inspection.

**Verification:** At least 90 days before ordering the exterior lighting, the project owner shall provide the lighting plan to the CPM for review and approval. The CPM

will notify the project owner of approval or disapproval within 15 days of receipt of the lighting plan. If the CPM notifies the project owner that any revisions of the plan are needed before the CPM will approve the plan, within 30 days of receiving that notification the project owner shall submit to the CPM a revised plan.

The project owner shall notify the CPM within seven days of completing exterior lighting installation that the lighting is ready for inspection. If the CPM notifies the project owner that revisions of the submittal are needed before the CPM will approve the submittal, within 30 days of receiving that notification, the project owner shall prepare and submit to the CPM a revised submittal.

The project owner shall notify the CPM within seven days after completing installation of the landscaping that the landscaping is ready for inspection.

**VIS-4** To minimize potential visual impacts, the project owner shall place all electrical transmission poles as to not be directly in front of any residences.

Protocol: Prior to construction of the transmission line, the project owner shall submit a plan to the CPM showing:

- All proposed pole locations;
- All residences within one-quarter mile of the proposed transmission route that have a view of the transmission line.

Installation of transmission line poles shall not begin before the plan is approved. The project owner shall notify the CPM when the poles have been installed and are ready for inspection.

Verification: At least 60 days prior to beginning transmission line construction, the project owner shall provide the electrical transmission pole plan to the CPM for review and approval.

If the CPM notifies the project owner that any revisions of the plan are needed before the CPM will approve the plan, within 30 days of receiving that notification, the project owner shall submit to the CPM a revised plan.

**VIS-5** Prior to the start of commercial operation, the project owner shall implement a landscape plan that meets the requirements of the Kern County Zoning Code.

a. The project owner shall submit to the CPM for review and approval a specific plan describing its landscaping proposal. The project owner shall provide the CPM a letter of comment from the Kern County Planning Director stating that the landscape plan is consistent with the provisions of the Kern County General Plan and Zoning Ordinance. The plan shall include, but not be limited to:

- a detailed landscape plan, at a reasonable scale, which includes a list of proposed tree and shrub species and sizes and a discussion of the suitability of the plants for the site conditions and mitigation objectives.

- maintenance procedures, including any needed irrigation; and
- a procedure for replacing unsuccessful plantings.

b. If the CPM notifies the project owner that plan revisions are needed, the project owner shall prepare and submit to the CPM a revised plan for CPM approval.

c. The trees and shrubs shall not be planted before the plan is approved. The project owner shall notify the CPM when the trees and shrubs have been planted and are ready for inspection.

**Verification:** At least 90 days prior to the start of commercial operation, the project owner shall submit the proposed landscape plan to the CPM for review and approval. The CPM will respond to the project owner within 15 days of receipt of the landscaping plan.

The project owner shall submit any required revisions within 15 days of notification by the CPM. The CPM will respond to the project owner within 15 days of receipt of the revised documents. The project owner shall notify the CPM in the next Monthly Compliance Report following completion of the proposed planting that the planting is ready for inspection.

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**ATTACHMENT 1**  
**LIGHTING COMPLAINT RESOLUTION FORM**

## LIGHTING COMPLAINT RESOLUTION FORM

<b>ELK HILLS POWER PROJECT Kern County</b>
Complainant's name and address:
Phone number:
Date complaint received: Time complaint received:
Nature of lighting complaint:
Definition of problem after investigation by plant personnel:
Date complainant first contacted:
Description of corrective measures taken:
Complainant's signature: _____ Date: _____
Approximate installed cost of corrective measures: \$ _____
Date installation completed:
Date first letter sent to complainant: _____ (copy attached)
Date final letter sent to complainant: _____ (copy attached)
This information is certified to be correct:
Plant Manager's Signature: _____

(Attach additional pages and supporting documentation, as required.)

## **VISUAL RESOURCES APPENDIX A**

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### **Visual Resources Figures 2 through 6a**

**VISUAL RESOURCES Figure 2**  
**KOP 1 (Existing View of Proposed Power Plant)**



**VISUAL RESOURCES Figures 2a  
KOP 1 (Simulation)**

**VISUAL RESOURCES Figure 3**  
**KOP 2 (Existing View)**

**VISUAL RESOURCES Figure 3a**  
**KOP2 (Simulation)**

**VISUAL RESOURCES Figure 4**  
**KOP 3 (Existing View)**

**VISUAL RESOURCES Figure 4a**  
**KOP 3 (Simulation)**

**VISUAL RESOURCES Figure 5**  
**KOP 4 (Existing View)**

**VISUAL RESOURCES Figure 5a**  
**KOP 4 (Simulation)**

**VISUAL RESOURCES Figure 6**  
**KOP 5 (Existing View)**



**VISUAL RESOURCES Figure 6a**  
**KOP 5 (Simulation)**

**VISUAL RESOURCES APPENDIX B**  
**Commission Staff's Visual Assessment Methodology Visual Resources**  
**Appendix B - Commission Staff's Visual Assessment Methodology**

**METHODOLOGY FOR ASSESSING VISUAL SETTING**

**Visual Factors**

Commission staff evaluated a number of factors in assessing the visual setting of the proposed project. These factors include visual quality, viewer sensitivity, visibility, and viewer exposure.

**Visual Quality**

The visual quality of a setting is the value of visual resources in that setting, determined by the visible environment's intrinsic physical properties and by associated cultural or public values (Andrews 1979; Smardon et al. 1986). Where publicly adopted goals, policies, designations or guidelines exist, they are given great weight in assessing visual quality. Where they do not exist, the analyst relies on experience and judgment to assess visual quality. The relevant physical properties of the environment include landform, vegetation, water, color, scarcity, and cultural modifications.

A basic premise in the evaluation of visual quality is whether a project will be compatible with the character of the landscape. In the case of predominantly natural settings, projects should be compatible with this character. It is possible for new structures to be compatible with predominantly natural settings if such settings already contain some structures that are considered compatible and the new structures are similar to the existing structures and do not appreciably change the balance of natural and cultural elements. However, in areas that appear to be totally natural, any modification that appears to be human-made will change the character of the area.

**Viewer Sensitivity**

One of the principal factors evaluated in assessing the potential for visual impacts is the sensitivity level of potential viewers. Viewer sensitivity is a measurement of the level of interest or concern of viewers regarding the visual resources of an area. It is generally expressed as high, moderate, or low. Local values and goals affect a viewer's expectations regarding a visual setting (Blair 1980). Concern regarding a change to a visual setting is often due at least in part to the symbolic effect of the change. A basic document for visual impact assessment states that "more often it is symbolic meaning, not preference, which motivates our value judgments and reactions" (Schauman 1986, p.105).

A visual change can be perceived as a symbol of a threat to the cultural stability and identity of a group or community (Costonis 1982). Viewer sensitivity can be determined in two ways, directly through evaluation of viewer attitudes or indirectly using viewer activities.

### **Viewer Attitudes (direct)**

The direct determination of viewer attitudes is normally done by surveying potential viewers. As mentioned above in the discussion on Visual Quality, the accurate determination of such information is very complex, involves well-designed, implemented and interpreted surveys, is usually labor intensive, and is usually expensive. Given these constraints and the mandated time schedule for power plant siting cases, it is generally not possible for Commission staff to conduct such a direct determination of viewer attitudes and be assured of accurate and valid results.

### **Viewer Activities (indirect)**

In situations where direct information on viewer sensitivity cannot be obtained, indirect methods are typically used in the visual profession to gain an insight as to viewers' sensitivity regarding visual resources. Land use is considered a "useful indirect indicator of likely viewer response" (Blair 1986), and activities associated with some uses can result in an increased awareness of visual or scenic resources (Headley 1992). Use activities associated with 1) designated parks, monuments, and wilderness areas, 2) scenic highways and corridors, 3) recreational areas, and 4) residential areas are usually highly sensitive. Commercial uses are generally less sensitive as activities, and views are often focused on those commercial activities. Large scale industrial or agricultural processing facility uses are usually the least sensitive because workers are focused on their work, and often are working in surroundings with relatively low visual value.

### **Visibility**

Another important factor in assessing the existing visual setting, and thus potential impact is the visibility of the project. Visibility can differ substantially between view locations, depending on screening and the effect of the location of the visual change in the view. The smaller the degree of screening, the higher the visibility usually is and the greater the potential impact is likely to be. One factor potentially affecting screening is the season. Deciduous trees that provide substantial screening in summer may provide little screening in winter. Angle of view is also important. The closer the feature is to the center of the view area, the greater the impact is likely to be. Meteorological conditions can also affect visibility. For example, fog can make a cooling tower plume or stack plume unnoticeable, given particular fog density and distance from the viewer to the plume. Another factor affecting visibility is time of day. Although projects are generally more noticeable during daylight hours, lighting can make project structures and plumes more noticeable at night than during the day.

## **Viewer Exposure**

The degree to which viewers are exposed to a view by (a) their distance from the feature or view in question, (b) the number of viewers, and (c) the duration of view is called viewer exposure (Grinde and Kopf 1986). Viewer exposure is important in determining the potential for a change in the visual setting to be significant.

### **Distance**

As the distance between the viewer and the feature viewed increases, the perceived size of the feature and the ability to see details decreases. Distance zones may be usefully categorized as follows: foreground, or close-range; middleground, or mid-range; and background, or long-range. Within close-range distances, details such as surface textures and the fullest range of surface colors are clearly perceptible. Mid-range distances are characterized by visualization of complete surface features such as tree stands, building clusters, and small landforms. Long-range distances are dominated by the horizon and major landforms (Felleman 1986).

### **Numbers of Viewers**

Two measures of the number of viewers are important to consider in assessing the potential visual impact of a project. One is the absolute number of viewers. The other is the proportion of viewers in a viewshed who can see the project.

### **Duration of View**

The length of time that a view is visible to a viewer is another important factor to be considered in determining the importance of a view and the potential impact of a project. For a given activity, the longer the view duration, the greater the potential importance or impact. View durations range from a few seconds, as in the case of some travelers in motor vehicles, to a number of hours per day, in regard to some residential situations.

### **Key Observation Points**

The evaluation factors discussed above are considered in relation to Key Observation Point. Key Observation Points are chosen to provide the basis for evaluation of project impacts by comparing the appearance before and after project construction. Key Observation Points include locations which are chosen to be representative of the most critical locations from which the project will be seen. Additional Key Observation Points should be selected that represent typical views encountered in different classes of views within the viewshed, if they are not covered by critical viewpoints. Variables that should be considered in selecting Key Observation Points include relative project size, season, and light conditions.

## **METHODOLOGY FOR ASSESSING VISUAL IMPACTS**

### **Use of Objective vs. Subjective Methods**

The determination of visual resource impacts has traditionally been done using a completely subjective method relying exclusively on the knowledge and experience of the visual resources professional. The drawback to this approach is that it is difficult to relate the steps and process used in the analysis which lead to the conclusions which are drawn regarding visual impacts.

In the 1970s and 1980s, there was an attempt in the profession to develop more objective methods for determining potential impacts. While this led to a more understandable set of steps and processes, analyses often did not account for unusual situations not addressed by the standard procedure or gave the false impression that they were totally objective.

In recent years visual resource analysts have been developing a synthesis, in which an objective methodology has been used to develop the categories and the analysis process to be used in analyzing visual impacts, at the same time explicitly recognizing that subjective values are involved in selecting factors and assigning weights to factors. It is important that subjective judgements be identified and defined to the extent possible.

### **Key Observation Points**

As previously discussed, Key Observation Points include locations which are chosen to be representative of the most critical locations from which the project will be seen. For linear projects such as power lines, additional Key Observation Points are selected that represent any special project or landscape features such as skyline crossings, river crossings, or substations.

Because each Key Observation Point represents a critical location, a typical view encountered in a class of view, and/or a special project or landscape feature, it also represents an important specific aspect of the viewshed that is susceptible to visual impacts. Therefore, the visual impact of a project is determined for each Key Observation Point, not from an "overall" perspective that masks the specific impacts.

### **Major Impact Evaluation Factors**

For each Key Observation Point Commission staff considers the susceptibility to visual impact and the severity of impact are considered together to determine the significance of impact. The following sections explain how these two major factors are assessed and considered. Other potential causes of significant visual impacts, such as night lighting, visible emission plumes, and noncompliance with laws, ordinances, regulations, and standards, are addressed separately in this analysis.

## **Susceptibility to Impact**

The first step in evaluating the visual impact of a project from a particular Key Observation Point is to consider the elements of the existing visual setting (discussed previously), including visual quality, viewer sensitivity, visibility, and viewer exposure. Each of these factors is assessed as either high, moderate to high, moderate, low to moderate, or low. Staff combines these factors into a measure of the susceptibility of the view from a particular Key Observation Point to visual impact. A low value for any of the four factors generally results in low susceptibility to impact.

## **Impact Severity**

As previously discussed, the degree of visual impact that a project will cause depends on the degree of change resulting from the project upon visual character or visual quality, here called the impact severity. Commission staff considers both the relationship of the project to the other components visible in the landscape, and blockage from view or elimination by the project of any previously visible components.

## **Relationship of the Project to Other Visible Components**

### **Landscape Components**

The three basic landscape components are land and water, vegetation, and structures.

### **Visual Elements**

The basic elements of each physical component of a view include color, form, line, texture, scale, and spatial character. The impact of a project is assessed in terms of contrast in color, form, line, texture, and scale, as well as scale dominance and spatial dominance. Scale is the proportionate size relationship between an object and its surroundings. Absolute scale is the size of an object obtained by relating its size to a definitely defined standard (i.e., measurement). Relative scale is the relative size of objects; the apparent size relationship between landscape components. Sub-elements of scale include *scale dominance* (the scale of an object relative to the visible expanse of the landscape and to the total field of view of the human eye or camera) and *scale contrast* (the scale of an object relative to other distinct objects or areas in the landscape). *Spatial dominance* is the measure of the dominance of an object due to its location in the landscape. Regarding these three factors, a change has the greatest potential to cause impacts in regard to scale dominance, and the least potential in regard to scale contrast.

## **Assessment of Contrast**

Staff assesses contrast with existing structures, vegetation, and land/water in regard to color, form, line, texture, and scale. Regarding these factors, contrast in color, form, or line has greater potential to cause impacts than contrast in texture or scale.

The magnitude of the visual impact of a project is measured by the degree of change that it causes. In regard to contrast, the degree of change depends partly on the existing levels and types of contrast. For instance, if existing structures already contrast strongly with natural features, the addition of a similar structure tends to cause a smaller change than if no structures already existed. In addition, the degree of contrast depends on the proximity of the project to the landscape component to which it is compared. If a project is superimposed on a component (such as body of water), the potential for contrast is greater than if the project is near such a landscape component, and even greater than if the project is far from the landscape component.

## **Factors Affecting Contrast**

Among the basic characteristics of the visual setting previously discussed, distance is a factor in determining the visual contrast that a project will create. Increasing distance can decrease perceived contrast both by reducing the apparent size of project structures and by reducing clarity of view due to atmospheric conditions.

Several additional factors can also influence the degree of contrast that a project may cause. These include atmospheric conditions, light conditions, motion, seasonal changes, and recovery time (BLM 1986).

## **Blockage or Elimination of Existing Elements**

In regard to obstruction or elimination of previously visible components, the analysis evaluates any change between the visual quality of those components compared to the visual quality of the project. Blockage of higher quality visual elements by lower quality elements can cause impacts, potentially as great as those regarding scale dominance.

## **Assessment of Visual Impact Severity**

**VISUAL RESOURCES Table B-1** shows how staff calculates impact severity from each Key Observation Point.

## **Determination of Significance**

Commission staff considers the following factors in determining whether a visual impact will be significant. These factors are not a complete listing of all the considerations that staff uses in its analyses, because many such considerations are site-specific.

## State

The California Environmental Quality Act Guidelines make it clear that aesthetic impacts can be significant adverse impacts by defining "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including . . . objects of historic or aesthetic significance. (Cal. Code Regs, tit.14, § 15382.) Appendix G, subdivision (b), of the Guidelines state that a project "will normally have a significant effect on the environment if it will have a substantial, demonstrable negative aesthetic effect."



**VISUAL RESOURCES Table B-1**  
**Staff's Visual Impact Severity Assessment Process**

	SEVERITY SCORE				
	Extreme	Strong	Moderate	Weak	Negligible
<b>SEVERITY FACTOR</b>					
CONTRAST					
<b>Color Contrast</b>		High	Medium		Low
		Or	Or		or
<b>Form Contrast</b>		High	Medium		Low
		Or	Or		or
<b>Line Contrast</b>		High	Medium		Low
		Or	Or		or
<b>Texture Contrast</b>			High	Medium	Low
			Or	or	or
<b>Scale Contrast</b>			High	Medium	Low
			or	or	or
DOMINANCE					
<b>Scale</b>	Dominant	Co-Dominant	Subordinate		Insignificant
		Or	Or		or
<b>Spatial</b>		Dominant	Co-Dominant	Subordinate	Insignificant
VIEW BLOCKAGE	Substantial blockage of high quality view	Moderate blockage of high quality view or substantial blockage of moderate to high quality view	Minor blockage of high quality view, moderate blockage of moderate to high quality view, or substantial blockage of moderate quality view	Minor blockage of moderate to high quality view, moderate blockage of moderate quality view, or substantial blockage of low to moderate qual. view	Minor blockage of moderate, low to moderate, or low quality view; moderate blockage of low or low to moderate quality view; or substantial blockage of low quality view
COMBINED FACTORS	Two or more of the above factors with a severity score of strong.				

## **Local**

As discussed above, Commission staff considers any local goals, policies or designations regarding visual resources. Conflicts with such laws, ordinances, regulations, and standards can constitute significant visual impacts.

## **Professional Standards**

Professionals in visual impact analysis have developed a number of questions as a means of evaluating the potential significance of visual impacts (see, e.g., Smardon 1986). The questions listed below address issues commonly raised in visual analyses for energy facilities:

Will the project substantially alter the existing viewshed, including any changes in natural terrain?

Will the project deviate substantially from the form, line, color, and texture of existing elements of the viewshed that contribute to visual quality?

Will the project substantially degrade the existing visual quality of the viewshed or eliminate or block views of valuable visual resources?

Will the project significantly increase light and glare in the project vicinity, particularly night-time glare?

Will the project result in significant amounts of backscatter light into the night-time sky?

Will the project be in conflict with directly-identified public preferences regarding visual resources?

Will the project comply with local goals, policies, designations or guidelines related to visual quality?

Will the project result in a significant reduction of sunlight, or the introduction of shadows, in areas used extensively by the community?

Will the project result in a substantial visible exhaust plume?

Commission staff considers these questions, where applicable, in its impact assessment.

## **Consideration of Impact Susceptibility and Impact Severity**

For most operations impacts staff considers the assessment of the impact susceptibility in relation to the impact severity from each Key Observation Point to determine visual impact. Staff considers construction impacts, lighting impacts, and visible plume impacts separately.

### **Cumulative Visual Impacts**

Staff reviews the proposed project and its related facilities as well as other past, present, and future projects in the vicinity to determine whether potential cumulative visual impacts will occur and whether those impacts will be significant. In addition, in the case of cogeneration facilities where the proposed power plant is to be part of an already existing industrial facility, this review examines whether the addition of the proposed project and its related facilities will result in cumulative visual impacts and whether they will be significant. If past activities have resulted in significant impacts, and the project will appreciably increase the total impact, the project will contribute substantially to a significant cumulative impact. When cumulative visual impacts are found to be significant, whether in relation to other proposed projects or to the host industry, feasible mitigation measures will be recommended to reduce those impacts.

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# **CULTURAL RESOURCES**

Testimony of Roberta S. Greenwood and Dorothy Torres

## **INTRODUCTION**

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This analysis discusses cultural resources which are defined as the structural and cultural evidence of the history of human development and life on earth. Evidence of California's early occupation is becoming increasingly vulnerable due to the ongoing development and urbanization of the state.

Cultural resource materials may be found nearly anywhere in California: along the ocean coastline and on coastal islands; along rivers and streams; in coastal and inland valleys and lowlands; throughout the coastal and inland mountain ranges; throughout the interior deserts, and even under water. Cultural resources may be found on the ground or may be encountered at varying depths beneath the surface. In some areas of the state, a sequence of settlements on the same site may result in multiple layers of cultural resources representing diverse functions, different periods of time, or distinct groups of people. In other areas, the distribution of cultural materials may be much more dispersed.

Cultural resources are significant to the understanding of our culture, history and heritage. Critical to the analysis of cultural resources are the spatial relationships between the various features or elements of a given site and the relationship of the site to the surrounding environment, both culturally and geographically. These relationships provide information that can be used to piece together the sequence of human occupation and use of an area, and they begin to create a picture of the former inhabitants and their environment.

Staff's primary concerns in its cultural resource analysis are to ensure that all historic properties are recognized, potential impacts to significant sites are identified and that conditions are set forth which ensure no significant adverse impacts will occur to cultural resources. The determination of potential impacts to cultural resources from the proposed Elk Hills Power Project (EHPP) is required by the Siting Regulations of the California Energy Commission (Energy Commission) and by the California Environmental Quality Act (CEQA). Impacts to cultural resources may result either directly or indirectly during pre-construction, construction, maintenance, temporary shut-down, or ultimate abandonment of the project.

Three aspects of cultural resources are addressed in this analysis: prehistoric and historic archaeological resources, and ethnographic resources.

## **PREHISTORIC RESOURCES**

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, features, faunal remains, rock art, trails, other traces of prehistoric human behavior, or places of particular concern to Native American people. In California, the prehistoric period began more than 10,000 years ago and extended into the 18th century when the first Euro-Americans explored California.

## **HISTORICAL RESOURCES**

Historical archaeological resources are those materials usually associated with exploration, settlement, or use of an area by persons other than Native Americans, and correlates with the beginning of a written historical record. They may include archaeological deposits, sites, structures, districts, traveled ways, artifacts, landscape, documents, or other evidence of human activity. Both the National Register of Historic Places and the California Register of Historical Resources consider as historical resources important properties which are 50 or more years old unless there are overriding considerations.

## **ETHNOGRAPHIC RESOURCES**

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans, and African, European, Asian or other immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, cemeteries, shrines, or ethnic neighborhoods and structures.

## **LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)**

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Cultural resources are indirectly protected under provisions of the federal Antiquities Act of 1906 (Title 16, United States Code, § 431 et seq.) and subsequent related legislation, policies and enacting responsibilities, e.g., federal agency regulations and guidelines for implementation of the Antiquities Act. The following laws, ordinances, regulations, standards and policies apply to the protection of cultural resources in California. Projects licensed by the Energy Commission are reviewed to ensure compliance with these laws.

## **FEDERAL**

Portions of the routes proposed for the electric transmission lines cross land managed by the US Bureau of Land Management (BLM). Therefore, the project may become an “undertaking” according to federal definition and the BLM would be involved as the lead federal agency for cultural and paleontologic resources. If cultural resource sites are identified on non-federal lands, and they meet federal criteria for eligibility for listing in the National Register of Historic Places, then federal laws would also apply to these resources.

- National Environmental Policy Act (NEPA): Title 42, United States Code (USC), section 4321 et seq., requires federal agencies to consider potential environmental impacts of projects with federal involvement and to consider appropriate mitigation measures.
- Federal Land Policy and Management Act (FLPMA): Title 43, USC, section 1701 et seq., requires the Secretary of the Interior to retain and maintain public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resource, and archeological values [Section 1701(a)(8)]; the Secretary, with respect to the

public lands, shall promulgate rules and regulations to carry out the purposes of this Act and of other laws applicable to public lands [Section 1740].

- 48 Federal Register 44739-44738, 190; September 30, 1983: Federal Guidelines for Historic Preservation Projects: The US Secretary of the Interior has published a set of Standards and Guidelines for Archaeology and Historic Preservation. These are considered to be the appropriate professional methods and techniques for the preservation of archaeological and historical properties. The Secretary's standards and guidelines are used by federal agencies, such as the Forest Service, the Bureau of Land Management, and the National Park Service. The State Historic Preservation Office refers to these standards in its requirements for selection of qualified personnel and in the mitigation of potential impacts to cultural resources on public lands in California.
- National Historic Preservation Act 16 USC 470, commonly referred to as "Section 106," requires federal agencies to take into account the effects of their undertakings on historic properties through consultations beginning at the early stages of project planning. Regulations revised in 1997 (36 CFR Part 800 et seq.) set forth procedures to be followed for determining eligibility for nomination, the nomination, and the listing of cultural resources in the National Register of Historic Places (NRHP). The eligibility criteria and the process are used by federal, state and local agencies in the evaluation of the significance of cultural resources. Very similar criteria and procedures are used by the state in identifying cultural resources eligible for listing in the State Register of Historic Resources. Recent revisions to Section 106 in 1999 have emphasized the importance of Native American consultation.
- Executive Order 11593, "Protection of the Cultural Environment," May 13, 1971 (36 Federal Register 8921) orders the protection and enhancement of the cultural environment by providing leadership, establishing state offices of historic preservation, and developing criteria for assessing resource values.
- American Indian Religious Freedom Act: Title 42 USC 1996 protects Native American religious practices, ethnic heritage sites, and land uses.
- Native American Graves Protection and Repatriation Act (1990): Title 25, USC, Section 3001, et seq. defines "cultural items," "sacred objects," and "objects of cultural patrimony"; establishes an ownership hierarchy; provides for review; allows excavation of human remains, but stipulates return of the remains according to ownership; sets penalties; calls for inventories; and provides for return of specified cultural items.

## STATE

- Public Resources Code, section 5020.1 defines several terms, including the following:
  - (j) "Historical resource" includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically

significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.

(q) "Substantial adverse change" means demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired.

- Public Resources Code, section 5024.1 establishes the California Register of Historical Resources; sets forth criteria to determine significance; defines eligible properties; and lists nomination procedures. The criteria are essentially the same as for eligibility to the NRHP, but stipulate that some properties which may not retain sufficient integrity to meet NRHP standards, may still be eligible for the California Register.
- Title 14, California Code of Regulations, section 4852(c) explains that a resource that has lost its historic character or appearance may still have sufficient integrity for the California Register.
- Public Resources Code, section 5097.5 states that any unauthorized removal or destruction of archaeologic or paleontologic resources on sites located on public land is a misdemeanor. As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority or public corporation, or any agency thereof.
- Public Resources Code, section 5097.98 defines procedures for notification of discovery of Native American artifacts or remains and for the disposition of such materials.
- Public Resources Code, section 5097.99 prohibits obtaining or possessing Native American artifacts or human remains taken from a grave or cairn and sets penalties for these actions.
- Public Resources Code, section 5097.991 states that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated.
- Public Resources Code, section 21000: et seq., California Environmental Quality Act (CEQA). This act requires the analysis of potential environmental impacts of proposed projects and requires application of feasible mitigation measures.
- Title 14, California Code of Regulations, section 15064.5 states that the lead agency determines whether a project may have a significant effect on important archaeological resources; if so, an EIR shall address these resources. If a potential for damage to significant archaeological resources can be demonstrated, such resources must be avoided, if they can not be avoided, mitigation measures shall be required. If a resource is found to be a historical resource, Public Resources Code 21083.2 does not apply and the criterion as "unique" is now replaced by the standards for eligibility to the California Register.
- Public Resources Code, Section 21084.1 indicates that a project may have a significant effect on the environment if it causes a substantial adverse change in



the significance of a historic resource; the section further defines a “historic resource” and describes what constitutes a “significant” historic resource.

- CEQA Guidelines, Title 14, California Code of Regulations, section 15126.4, “Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects,” Subsection (b) “Mitigation Measures Related to Impacts on Historical Resources”: Subsection (b) discusses impacts of maintenance, repair, stabilization, restoration, conservation, or reconstruction of a historical resource. Subsection (b) discusses mitigation through avoidance of damaging effects on any historical resource of an archaeological nature, preferably by preservation in place; alternatives include documentation or data recovery by scientific excavation if avoidance or preservation in place is not feasible. Data recovery must be conducted in accordance with an adopted data recovery plan.
- CEQA Guidelines, Title 14, California Code of Regulations, section 15064.5, “Determining the Significance of Impacts to Archaeological and Historical Resources”: Subsection (a) defines the term “historical resources.” Subsection (b) explains when a project may be deemed to have a significant effect on historic resources and defines terms used in describing those situations. Subsection (c) describes CEQA’s applicability to archaeological sites and provides a bridge between the application of the terms “historic resources” and “archaeological resources.”
- CEQA Guidelines, Title 14, California Code of Regulations, section 15064.7, “Thresholds of Significance”: This section encourages agencies to develop thresholds of significance to be used in determining potential impacts and defines the term “cumulatively significant.”
- CEQA Guidelines, Appendix G: “Issue V: Cultural Resources.” Lists four questions to be answered in determining the potential for a project to impact archaeological, historical, and paleontological resources.
- California Penal Code, section 622.5: Anyone who willfully damages an object or thing of archaeological or historic interest can be found guilty of a misdemeanor.
- California Health and Safety Code, Section 7050.5: If human remains are discovered during earth disturbing activities or construction, the project owner is required to contact the county coroner.
- Public Resources Code, section 5097.98: If the county coroner determines that the remains are Native American, the coroner is required to contact the Native American Heritage Commission, which is then required to determine the “Most Likely Descendant” to inspect the burial and to make recommendations for treatment or disposition of the remains and any associated burial items.

## LOCAL

Although the Energy Commission has pre-emptive authority over local laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies. The project site and associated linear facilities are all located within unincorporated portions of western Kern County.

## **KERN COUNTY**

General provisions of the Kern County General Plan of 1994 require maintenance of a County inventory of areas with potential cultural and archaeological significance (EHPP 1999a, page 6-35).

## **ENVIRONMENTAL SETTING**

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### **REGIONAL DESCRIPTION**

The project area is within the Great Valley Physiographic Province, which is bounded on the south by the Transverse Range; on the east by the Sierra Nevada Range; on the north by the deltas of the San Joaquin and Sacramento rivers; and on the west by the Temblor Range (an interior portion of the Coast Ranges). The Kern River flows west across the valley floor from the western Sierra foothills, and southward into Lake Buena Vista.

The San Joaquin Valley comprises the southern part of the Great Valley Province. At one time this entire valley was covered by an ancient salt-water sea, which began to shrink during the late Pleistocene, leaving vast areas of wetland and tules in the shallows around the shores of ancient lakes Buena Vista and Tulare. These lakes were in the low spots of the flood plain and were renewed by the frequent flooding of the Kern River. The shorelines of Buena Vista are in close proximity to the southeast end of the Elk Hills Oil and Gas Field, and as late as the 1840's, prior to the control of water resources for irrigation, would have constituted a favorable environment for prehistoric settlement. Today the project area is generally arid, existing vegetation is dominated by desert saltbush, and there are no longer any perennial streams (EHPP 1999a).

Ancient geologic activity in the Temblors, which caused folding and deformation of the underlying rock layers, transformed some of these rocks into new types. Among these resulting new rock types is the chert which archaeological investigations have demonstrated was quarried and utilized by prehistoric people to make stone tools. Other geologic conditions caused underlying petroleum deposits to rise to the surface along fault lines, forming the tar seeps used by both Native Americans and modern settlers (EHPP 1999a).

### **PROJECT VICINITY DESCRIPTION**

The proposed Elk Hills project is located in the Elk Hills Oil and Gas Field near the southwestern edge of the San Joaquin Valley in Kern County, California. The project area is about 25 miles southwest of Bakersfield. The project vicinity includes Buena Vista Valley and the Buena Vista Hills and Oil Field on the west, and lies south of State Highway 58. A topographic feature of relevance to prehistoric settlement is the Buena Vista Lake Bed, across the California Aqueduct toward the southeast.

Physiographically, the San Joaquin Valley is a large, northwest-trending alluvial plain between the Sierra Nevada Mountains to the east, the Diablo and Temblor

Ranges on the west, the Tehachapi Mountains on the south, and the San Joaquin River on the north. The valley is filled with alluvial sediments eroded from the mountains on both sides (DOE 1997). The Elk Hills represent a foothill spur of the Temblor Range which is about 16 miles long and 6 miles wide, reaching an elevation of 1,551 feet (about 1,000 to 1,200 feet above the Valley floor. The Elk Hills Oil and Gas Field is an anticline composed of recently uplifted stratified alluvial soils.

The Elk Hills Oil and Gas Field comprises the oil and gas production and processing area formerly known as the Naval Petroleum Reserve Number 1 (NPR-1), now operated by the Occidental of Elk Hills, Incorporated (OEHI). The field is approximately 47,000 acres, of which approximately 706 acres were surveyed for cultural remains.

As presently proposed, the Elk Hills Power Plant consists of several elements:

- The power plant site would be located on the 12 acres adjacent to Elk Hills Road, northeast of its intersection with Skyline Road. Included with the plant site are Route 4, the gas supply line, and a 0.25-mile buffer.
- The Area of Potential Effect(APE) for transmission line Route 1A, the west-east transmission line to Tupman, was defined as 200 feet wide and 9 miles long. Minor adjustments have been made to the original alignment.
- The APE for transmission line Route 1B (south-north transmission line to Buttonwillow) is 200 feet wide and approximately 8.6 miles long. Minor adjustments have been made to this corridor.
- Transmission line variation Route 1B parallels, approximately the west side of Route 1B from the plant site to the California Aqueduct.
- Alternative Route 1C was a transmission line along Elk Hills Road, generally parallel to 1B, subsequently abandoned. The APE was 200 feet wide and approximately 5.5 miles long.
- Route 2 is the raw water supply line running approximately east-west with an APE 100 feet wide and is approximately 9.8 miles long.
- Route 3 is the wastewater disposal line originating at the power plant with a south-north APE approximately 4.4 miles long and 100 feet wide, terminating in new disposal wells.
- Route 4 is a new, west-east 10-inch natural gas supply pipeline elevated above ground for 2,500 feet west that originates from the OEHI processing facilities.
- Other possible areas of potential effect include new facilities at the Midway substation; facilities which may need relocation; new spur roads needed for access during construction; potential interconnections of the La Paloma Generating Project (La Paloma) and Sunrise Cogeneration and Power Project (Sunrise) projects with Elk Hills; the residence on PG&E property between the substation fenced areas and Highway 58.

## PREHISTORIC SETTING

Archaeological literature indicates that early residents of California typically lived near water sources that could provide them with access to a wide variety of plant and animal resources. Evidence from archaeological sites found along the shorelines of ancient lakes Buena Vista and Tulare indicates that native peoples may have occupied the project area as early as 8,000 years ago. These prehistoric lakes were surrounded by great marshy sloughs and wetlands that were well populated by animals and waterfowl, offering a wide variety of food and material resources for prehistoric peoples. According to the Cultural Resources Inventory of the Elk Hills Power Project, hereafter cited as CRI, the potential cultural resource sensitivity of the region is greatest near the water resources (EHPP 1999a; CRI 1999). The presence of a local source of chert would have been another incentive for at least temporary exploitation of this resource.

Archaeologists have proposed several different developmental chronologies for the project region. Evidence from archaeological sites excavated in the 1930s led archaeologists to their opinion that there were similarities between the type of archaeological assemblages found in the project area and those found outside the region. Some of the dart points discovered at archaeological sites along the shorelines of ancient Lake Tulare suggest that these sites could possibly have been populated by hunters of big game as early as 11,000 years ago (EHPP 1999a; CRI 1999).

Later excavations in 1964 revealed artifacts in close proximity to fresh-water shell, which could be dated at about 10,000 “years before the present” (ybp). However, archaeological experience has shown that dates obtained from freshwater shell may be misleading and artifacts found in close proximity to such shells might not necessarily share the same dates. The physical remains demonstrate a technological evolution of tool types, increasing use of more diverse ecological zones, and greater sedentism through time.

As described in the Application for Certification (AFC), known Native American prehistoric cultural resources in the project vicinity include archaeological sites representing residential bases, field camps, and structures. Known resources recorded in the project area include large, complex sites indicating residential use and include burials, sites with a great abundance and diversity of cultural materials, areas of shell and/or lithic scatters, and widely separated and isolated artifacts (CRI 1999 ). One synthesis has proposed four distinct phases of discontinuous occupation beginning more than 8,000 years ago, with the different episodes of utilization and abandonment perhaps influenced by climatic conditions which altered the lake levels and regional ecology (CRI 1999). Areas presumably disturbed by agricultural or extractive activities in the lowlands may still contain deeply buried deposits with good integrity, under the thick layers of valley alluvium.

The Cultural Resource Management Plan (CRMP) of 1998 prepared for the Department of Energy (DOE) analyzed site distribution within NPR-1, and observed that site density was highest along the Elk Hills-Buena Vista Slough ecotone where there was a diversity of subsistence resources and suitable terrain. Surveys have

concluded that the most likely location for multiconstituent or complex sites is on the north side of NPR-1 at elevations below 750 feet. It was emphasized that because sites may survive on deflated landforms, or be buried by alluvial and colluvial processes, it is very difficult to recognize the presence, size, or importance of archaeological remains from surface observations.

The research context for analysis and evaluation of the prehistoric sites is organized on three hierarchical levels: archaeological context, past lifeways, and culture process (CRMP 1998). The first of these includes topics such as the site formation processes, paleoenvironment, and cultural chronology. Past lifeways addresses issues such as settlement pattern, subsistence practices, and technology. The highest level of inquiry, culture process, seeks to explain such questions as hunter-gatherer adaptations, resource exploitation strategies, social and economic aspects, trade and exchange, and influence of the environment. Not every site will contain the data to approach all of the issues, but all information is incremental and contributes to the understanding of the broad region.

## **ETHNOGRAPHIC BACKGROUND**

The prehistoric marshland environment along the lakeshores was rich in fish, waterfowl and other animals, and would have supported a variety of useful plants. It was an abundant source of many necessities of life and it is likely that, with such resources, many tribal groups were able to maintain occupation at the same location throughout most of the year. The project area is located within the ethnographic boundaries of the Southern Valley Yokuts, and the town of Buttonwillow was originally a Yokuts meeting place and dance ground. A number of individual tribal groups were known to exist at the time of contact with historical explorers (Wallace 1978). Yokuts tribal groups living in the project area included the Tulamni who occupied the now dry Buena Vista lakebed, watershed, and areas west of the lake; the Chuxoxi who inhabited the channels and sloughs north of Elk Hills; the Yawelmani east of Buena Vista Lake; and the Wogiti west of Elk Hills near McKittrick. Three named villages are known in the general project area but outside the Elk Hills Oil and Gas Field. The lake and marshlands provided shelter to a great variety and abundance of wildlife and the rich food sources allowed the Yokuts peoples to live there most of the year. Archaeological artifacts associated with the Yokuts people include triangular projectile points, preserved textiles, pottery, glass beads, and steatite artifacts (CRI 1999).

The literature also indicates that the project area may have been influenced culturally by contact with Chumash people. The Chumash traditionally occupied coastal and inland areas from Topanga Canyon in Los Angeles County to northern San Luis Obispo County. With reference to the project area, the Cuyama band would have been contemporaries occupying the Temblor Mountains and Cuyama Valley west of the project area. The Emigdiano and Castac tribes lived farther to the south and southeast, respectively (CRI 1999). The southern portion of the central valley would have constituted a route of travel or trade. The archaeological evidence does indicate there was such trade; artifacts associated with the Chumash include shell beads, fine baskets, projectile points, sandstone, oak and steatite bowls. The Chumash are also well known for extraordinary rock art and numerous

sites have been recorded within their traditional lands in the coastal range (Grant 1978, EHPP 1999a).

Thus, portions of the project area may have been influenced archaeologically by both the Yokuts and the Chumash people. There is evidence of trade and artifacts from either group could be present in areas affected by the project. As surviving Native Americans were dispersed among the missions and to reservations, and many were employed as laborers and vaqueros on land grant ranches after secularization of the missions in the 1830s, there may have been a gradual melding of the languages and cultures over time (CRI 1999).

## **HISTORIC SETTING**

The major themes related to the historical period include Spanish explorations, the Mission period, pioneer development and ranching, water projects in the San Joaquin valley, transportation, and development of the Elk Hills Oil and Gas field.

Spanish explorations in the project region began with the travels of Pedro Fages in 1773 and Fr. Francisco Garces in 1776, followed by the two expeditions in 1806 by Fra. Antonio Zalvidea and Lt. Moraga in search of mission locations. Fages visited at least one Yokuts village on the shore of Buena Vista Lake. No missions were established, and some of the subsequent expeditions between 1808 and the 1820s were conducted to capture Indians who had fled from missions. These efforts would have left little effect on the region.

Visits by European explorers increased in the early 1800s, but the southern San Joaquin Valley remained relatively sparsely settled for some time. Beginning in the 1830s, toward the end of the Spanish period and into the Mexican period, large tracts of land were granted to Mexican and other European settlers and used primarily for cattle grazing in support of the trade for hides and tallow. Although such Kern County ranchos as El Tejon and San Emigdio employed some of the mission Indians, they were still beset by cattle and horse raids from the nearby native communities. The most profound effect on the environment was the replacement of native vegetation by exotic grasses and forbes introduced by the new animals. Culturally, there ensued severe disruption of the Native American populations (CRI 1999).

The first waves of pioneer settlement and population growth, which took place elsewhere in California after the mid-nineteenth century, largely bypassed this part of the San Joaquin Valley because of the unfavorable climate and lack of timber and potable water. Hispanic Californios carried on small-scale cattle and sheep ranching and horse trading on the west side of the valley, joined by some Basque and Portuguese herders. The first private landowner in the Elk Hills was Alice J. Miller (or Muller) in 1905, and by 1910, nearly all of the Elk Hills, not owned by the government, had been claimed (CRI 1999).

As the old Mexican land grants and small holdings were gradually aggregated into major ranches, such as the Miller and Lux Land Company of the 1850s which ultimately acquired 700,000 acres, irrigation canal projects proliferated and

conflicting claims to Kern River water were only settled by the California Supreme Court in 1886. Miller and Lux acquired the Kern Valley Water Company, leader in irrigation projects in the southern San Joaquin Valley through the 1920s. After that time, the large-scale development of more efficient hydroelectric power made it economically feasible to pump groundwater for irrigation, contributing to greater expansion of farm production.

Since prehistoric times, the Valley has served as a route of travel and trade, for Native Americans, fur traders, ox cart and wagon roads (El Camino Viejo, the Old Los Angeles Trace or Old West Side Road), and parallel paths for the Stockton-Visalia and Butterfield overland stages. Construction of the Southern Pacific Railroad along the east side of the Valley in 1877 led to expansions in wheat farming and ranching, and in 1893, the Southern Pacific opened a branch line through the Elk Hills from Bakersfield to Asphalto (now McKittrick) to serve the growing asphalt industry there (CRI 1999). These transportation improvements facilitated industrial growth and prosperity, expanded markets for the local products, brought about a population increase of 45 percent between 1900 and 1930, and stimulated interest in the exploration for oil.

Petroleum extraction in the region had begun with the Buena Vista Petroleum Company's refinery north of McKittrick in the 1860s, but the cost of transportation at the time made this a minor effort. The railroad, coupled with major discoveries in the McKittrick, Sunset, Kern River, and Elk Hills oil fields in the early 1900s, led to a rush to develop oil fields on the west side of the valley. Three companies acquired control of the resource and refineries: Standard Oil, Southern Pacific, and the cooperative called Associated Oil.

Early in this century the U. S. Navy expressed to Congress their concern for the strategic security of the nation's oil supply, and requested creation of defined petroleum reserves. In September, 1912, an executive order signed by President Taft created Naval Petroleum Reserve No. 1 (NPR-1) covering about 38,000 acres in the Elk Hills. Leases were acquired from the Navy by Standard Oil and speculators, and as the industry expanded in this remote area, families of many workers relocated to privately owned camps in the Elk Hills. Standard Oil's facility at Tupman not only supported field activities, but provided many residential amenities.

Concerned that such growth would deplete the government's reserve, the Navy undertook to drain the leased fields from offset wells, and to reclaim the leased resources. All claims had reverted to the government by 1938. Production was greatly increased during World War II, both to generate revenue and to supply naval needs. The Navy's Construction Battalions (SeaBees) moved onto NPR-1 to operate the wells, make improvements, and conduct wartime readiness drills, digging foxholes and building bunkers. These features survive on the northeast and northwest flanks of the oil and gas field (CRI 1999). Additional episodes of oil development followed in 1945, 1951, and 1976. The DOE operated NPR-1 (now the Elk Hills Oil and Gas Field) until February 1, 1998.

The draft Cultural Resources Management Plan (CRMP), prepared as a DOE document, and approved by SHPO in the DOE Programmatic Agreement (PA), 1998, devotes a single page to the historical resources and does not offer a research design. Section 2 of the CRMP lists three historic era properties (3 Hay wells) that are eligible for listing in the NRHP. Section 2.1 identifies further research to be done, and Section 2.2 refers to an historical publication to be prepared for public distribution. The maps provided as Appendix 2 to the CRMP depict the prehistoric sites exclusively. As described in the AFC, known historic era cultural resources of potential interest or concern would include transportation corridors and facilities; oil and gas production locations and installations; homesteads; commercial and residential communities, as represented by buildings, other structural elements and discards; work camps; sites; districts; landscapes; and objects (EHPP 1999a, CRI 1999). Many of the same research issues posed for the prehistoric sites would apply: archaeological context, settlement pattern, past lifeways, technology, adaptation to the environment, and all the subsets such as subsistence, chronology, social organization, economy, and the like. As with potential prehistoric resources, buried historical archaeological sites may be concealed from surface observations by superficial grading or land clearing, pavement, subsequent re-use of the landform, agricultural activity, sedimentation, or other process.

## **PRE-AFC LITERATURE AND RECORDS SEARCH**

Prior to preparation of the AFC, consultants to the applicant conducted a literature search and reviewed site records and maps at the Southern San Joaquin Valley Information Center of the California Historical Resources Information System (CHRIS) in December 1998. Records indicated numerous previous surveys had been done in the project area, but not all of the area potentially affected by the project had been surveyed. Much of the archival and survey work had been conducted in 1997 and 1998 by DOE as part of the divestiture process for NPR-1, but some of the surveys and records of sites within the APE were as old as 1979. The applicant's consultant also reviewed lists of historic properties included within the National Register of Historic Places, California Register of Historical Resources, California Points of Historic Interest, California Landmark files, and historical maps (CRI 1999).

For project construction and operation, the literature and record search focused on the Areas of Potential Effect (APE) defined as an area 0.25 mile around the power plant site, 100 feet to either side of the transmission lines, 50 feet on either side of the water supply and water disposal lines and 50 feet on either side of the natural gas line (CRI 1999).

Within 0.25 mile of the EHPP facilities as then proposed, there were a total of 71 recorded archaeological sites (26 prehistoric, 43 historical, and 2 containing both components) and 5 prehistoric isolated occurrences. At that time, one site within the APE for transmission Route 1A (CA-KER-3079/H, a multi-component site) had already been nominated to the National Register of Historic Places (NRHP) by the DOE, and three others within the buffer zones listed in the OEHI-DOE License Agreement were found eligible. These are CA-KER--5404 and -3080 within 0.25



mile of Route 1A, and CA-KER-3168 within the same buffer zone of transmission Route 1B.

Results of the literature review and a brief description of the known resources are summarized in the AFC, Appendix L-2, titled Cultural Resources Inventory of the Elk Hills Power Project (CRI). Site-specific information was filed with the Energy Commission under separate cover to maintain confidentiality of sensitive resource locations. For a summary of the results of the literature review and a brief description of the types of resources found at the recorded sites, refer to Tables 2 and 3, Revised in response to Data Requests 83 and 84 (EHPP 1999h).

## **PRE-AFC FIELD SURVEYS**

The record search indicated that roughly 36 percent of the project APE had been previously surveyed, but that some of those surveys had been completed more than 25 years ago, some site records did not meet currently prevailing professional standards, and the criteria for evaluation were not always specified, comparable, or consistent with current standards. State and federal guidelines recommend that survey records and maps more than five years old should be updated to determine whether any changes have occurred. The consultants to the applicant conducted a cultural resource survey of portions of the project APE to determine the current status and condition of selected previously recorded resources, examine areas which had not previously been surveyed, and to identify any additional resources that might be present in areas not surveyed before.

Some of the sites had previously been identified and their potential eligibility evaluated as part of the License Agreement made in 1998 between the Department of Energy (DOE) and Occidental of Elk Hills, Inc., pursuant to Occidental's acquisition of Naval Petroleum Reserve No. 1 (NPR-1). The Programmatic Agreement (PA) signed in 1998 set forth the stipulations to be followed regarding historic preservation standards, treatment of cultural items and human remains, consultation with Native Americans, and other procedural matters. A Draft CRMP was prepared as a DOE document. As the response to Data Request 86 makes clear, Occidental Energy Ventures Corp. and Sempra Energy Resources (OEHI) are not parties to the PA or CRMP (EHPP 1999g).

The consultant's record search indicated that about one-third of the APE had been previously surveyed for cultural resources over the prior 25 years and according to various survey methods and recording standards. During the new survey in November and December of 1998, a two-person field team walked in a series of parallel transects each covering a width of about 50 feet (15.24 meters). Visibility was reported as good along Route 1A and the north end of wastewater supply pipeline, Route 3, where grass cover was sparse or dormant, along the plowed fields of Route 1B north of the aqueduct, and along the high production areas of Route 2, the raw water supply pipeline. Grasses were thick, up to chest-high, and visibility was poor along Route 1B south of the aqueduct and at the eastern ends of Routes 1A and 2. Steep slopes were not surveyed (CRI 1999).

As described in the Elk Hills AFC, and previously in the Sunrise submission, the project vicinity and general area have been the scene of petroleum extraction for many years. Numerous traces of oil field development and remnants of oil production equipment were found during all surveys for both projects, and some of it may be more than 45 years old. Of the thirty-three (33) new sites recorded during pre-AFC surveys for Sunrise, all but one consisted of historical deposits. Most of the sites contained remains from oil and gas extraction activities and some of the sites also included household refuse. Most of those materials and sites were regarded as ineligible for listing on the National Register (SCPP 1998a, Pacific 1998a). The same historic types of sites and structural remains were encountered during Elk Hills research. In 1997, 53 historical oil wells and the 3G Gas Plant were recorded; all were believed ineligible for lack of integrity because some or all of the superstructural elements or features had been dismantled. The CRI listed eight historical sites and two multicomponent sites within the APE, representing one drilling location, five historical oil wells, two domestic sites, one artifact deposit, and one not described (EHHP 1999a, CRI 1999). All were considered as not eligible, and no action was recommended for any of them although five of the historical sites occur in the path of proposed project facilities. The following areas were examined in 1998-1999:

- The entire power plant site plus 0.25-mile buffer zone, for a total of 145 acres, including the natural gas supply pipeline, Route 4.
- Route 1A, approximately 109 acres.
- Route 1B, approximately 202 acres.
- Route 1B Variation power plant site to California Aqueduct, acreage not provided.
- Route 1C (subsequently abandoned), 143 acres.
- Route 2, approximately 80 acres.
- Route 3, approximately 26 acres.

In all, approximately 706 acres were surveyed. The fieldwork identified 18 previously recorded sites (8 prehistoric, 8 historical, and 2 dual-component) and added two prehistoric sites (temporary designations EHPP-1 and -2), and two additional prehistoric isolates. Several other site localities were grouped as single sites, and some site boundaries were modified (EHPP 1999a). Subsequent refinements, additions, and combinations culminated in the present total of 19 sites and five isolates within the APE (EHPP1999h).

The survey report cautioned that shell scatters are common along the transmission line routes and that such discrete scatters may represent very large site areas with a discontinuous distribution of cultural material on the surface. Further, the observed presence of shell has extended the presumed boundaries of at least two sites, and due to the quality and scale of site maps, the precise distance and relation of sites to the project's linear features is sometimes difficult to determine (EHPP 1999a).

## **POST-AFC FIELD SURVEY**

In data requests subsequent to the AFC, staff had requested that the applicant provide record and survey information for a portion of the Route 1B variation under consideration. This alignment begins at the power plant site and continues north-northeastward along the existing transmission line. It was surveyed as far as the California Aqueduct. That portion of the variant north of the Aqueduct had previously been inspected as part of Route 1B. The survey of the southern sector was conducted by two surveyors on August 23 and 24, 1999. Visibility was reported as very good (EHPP 1999f).

## ***POWER PLANT SITE AND IMMEDIATE LINEAR FACILITY ROUTES***

### **POWER PLANT SITE AND ROUTE 4**

The plant location encompasses approximately 12 acres at the southwest corner of the project area. There are no recorded archaeological sites, only one isolate, within the plant footprint or the 0.25-mile buffer surrounding the project and its facilities. The surveyors noted one depression toward the center of the area obscured by dense vegetation, and another along an ephemeral drainage east of the former where there were petroleum product odors.

Route 4 is the 2500-foot long, 6-inch natural gas supply line which will be built above ground on the power plant site. There are no known sites and a single isolate within the APE or 0.25-mile vicinity.

### **ROUTE 1A**

The alignment of the alternative Route 1A transmission line extends northeasterly from the plant site for about 9,000 feet, coterminous with the alignment of Route 1B, then turns generally east-west for a distance of approximately 9.0 miles from the plant to its termination at the California Aqueduct. Approximately 4.2 linear miles within the APE were newly surveyed, to fill in gaps in previous coverage. After two sites have been combined under a single designation, there are now eight sites and two isolated occurrences on record. The isolates, both prehistoric shell fragments, were newly added during the 1998 survey for the proposed EHPP. Four sites are prehistoric, two are historical, and two have both components. Five sites are directly on the transmission line, while the others are less than 100 feet distant. Fourteen additional sites and one prehistoric isolate are within 0.25 mile of the APE (EHPP 1999h). Site CA-KER-3079/H, a resource with both prehistoric and historical components, has been determined eligible for the NRHP and any impact will require mitigation. CA-KER-3080 was also determined eligible, and is approximately 500 feet from the APE, and significant site -5404 is 300 feet north of the APE (EHPP 1999h).

Many of the same research issues posed for the prehistoric sites would apply to the historical sites: archaeological context, settlement pattern, past lifeways, technology, adaptation to the environment, and all the subsets.

## ROUTE 1B

Alternative transmission line Route 1B exits the plant site in a north-northeasterly direction for about 4.3 miles and then heads north for 4.3 miles (mile post 4.3 to 8.6) to termination at bench mark (BM) 276. Approximately 7.75 miles of the APE were surveyed in 1998 since most of the alignment had not been previously examined. Two previously recorded prehistoric sites are directly on the line within the APE, and one isolate, not described, is within 100 feet. After the combination of two sites into a single designation, seven additional sites, one prehistoric isolate, and one unidentified isolate lie within the 0.25-mile buffer. CA-KER-3168H, containing both prehistoric and historical remains, is eligible, some 800 feet east of the APE (EHPP 1999h).

## ROUTE 1B VARIATION

Added to the AFC Figure 3 map (CRI 1999), this variation was surveyed in August 1999 after submission of the AFC. The APE surveyed extends north-northeast from the power plant along the existing transmission line as far as the California Aqueduct. The alignment north of the aqueduct had been surveyed. Shell fragments and chert flakes were observed, extending the size of one previously recorded site, which will be in the APE of either Route 1B or this variation. Other shell was noted about 75 feet west of this variant, in the vicinity of a previously recorded site apparently outside of the APE. A third prehistoric site was observed where the Route 1B survey had reported an isolate (EHPP 1999f); the location is not depicted on the Figure 3 map, so it is not clear at this time whether the known site is within the APE of this variant. One eligible with both prehistoric and historical components, CA-KER-3168/H, is 800 feet east of the APE (EHPP 1999h).

## ROUTE 2

The water supply pipeline is generally parallel to Skyline Road and about two miles to the south. It extends for approximately 8.6 miles eastward from the plant site to termination at the West Kern Water District storage facilities. About 6.1 miles of the 100-foot wide APE were surveyed in 1998 to complete the coverage. Nine sites are now known within the APE, one of them newly recorded during the most recent survey. Of these, three are prehistoric; one is an historical livestock/corral site with foundations and domestic artifact scatters, possibly a portion of Standard Oil's Hay-Carmen work camp dating from circa 1918; four are historical oil wells; and the ninth is another historical habitation site with domestic artifact scatters (no site record or other data provided). Six of the sites are directly on the pipeline corridor and the others are within 100 feet. One prehistoric "find" is not identified. Within 0.25 mile, there are an additional 32 sites and one prehistoric isolate, evidence of the high site density along this corridor. All but one of the sites are historical and none of these was regarded as significant (EHPP 1999h). The pipeline crosses a half-section of BLM property, and conditions of the National Historic Preservation Act apply to this part of the project.

One newly recorded site in the APE, EHPP-1, has not been tested or evaluated. The site record (CRI 1999) mentions features, described as two shell deposits on

opposite sides of a dirt road, and “other” which is not explained. Without further evaluation or detail, staff considers such resources as potentially eligible.

### **ROUTE 3**

The new wastewater discharge will be a 6-inch steel pipeline 4.4 miles long, extending from the plant site south to new disposal wells 4 miles south of the plant. Access will be provided by new dirt roads. Approximately 2 miles at the north end of the route were surveyed in 1998. No sites were recorded either in the APE or the buffer zone (EHPP 1999h).

## **ARCHITECTURAL RECONNAISSANCE**

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The AFC does not contain any architectural or engineering analysis of evidence remaining of the long history of oil production or the work camps which supported industrial activities. Although much of the oil and gas production equipment in the project vicinity was older than 45 years, and at least one historical site within the APE contains materials dating back at least to the 1920s and probably older, based on the presence of sun-colored amethyst glass, the structural elements, artifact deposits and research potential of historical remains were not assessed. The work camp site, for example, also contains a complex of foundations, roads and trails, privies, at least three trash deposits, railroad grades, walls and fences. This site, which includes comparable examples with both industrial and residential remains, and numerous wells spudded in during the 1920s were regarded as disturbed because superstructures were fragmentary or missing. Seemingly for this reason alone, these sites were evaluated as failing to meet the criteria for significance. The archaeological and engineering/technology aspects of such sites were not addressed, and historical landscape was not considered.

## **NATIVE AMERICAN CONTACTS**

The Elk Hills Oil and Gas Field was formerly operated by the DOE and in 1996 Congress directed the divestiture of the field. Since DOE had not completed eligibility evaluation on all cultural sites prior to the sale to OEHI, DOE prepared a Cultural Resources Management Plan (CRMP) and entered into a Programmatic Agreement (PA) to complete its legal requirements related to historic preservation following the sale. DOE also entered into a three-year License Agreement with OEHI that provides DOE access for implementation of the PA and the CRMP (EHPP 1999a, CRI 1999).

The PA requires DOE to consult with Native American tribes and individuals throughout implementation of the CRMP. OEHI and DOE have an ongoing program for Native American involvement in the area covered under the OEHI-DOE License Agreement. In November 1998, prior to beginning the AFC filing process, OEHI sent letters to representatives of the Native American community who previously expressed concern about resources in the vicinity of the project (EHPP1999a, CRI 1999).

Attachment E, to the confidential Cultural Resources Inventory, contains three letters sent by OEHI to tribal representatives. The AFC does not contain any written

responses to the applicant's letters, expressions of concern, or record of Native American participation in the surveys or site assessments. In January 1999, OEHI met with the Kern County Native American Preservation Council and the Elk Hills Coalition to present information concerning the proposed project. Attachment E contains a list of those attending the January meeting (EHPP 1999a, CRI 1999).

While an address and a contact at the Native American Heritage Commission was provided in the AFC, there is no indication that there was contact between OEHI and the Native American Heritage Commission. Furthermore, the AFC does not contain any information concerning the presence of Native American sacred sites in the project vicinity. However, this is often the case since members of the Native American community are often reluctant to divulge the location of sacred sites. This information is often protected until a project actually appears to be approaching such a resource area.

## **SUMMARY OF KNOWN RESOURCES WITHIN THE AREA OF PROJECT EFFECT**

The record search and field surveys now document the presence of 19 recorded archaeological sites and 5 isolates within the APE for the plant site and associated transmission lines and pipelines (EHPP 1999h Tables 2 and 3). For this purpose, the APE was defined as 0.25 mile around the power plant, 100 feet on either side of the transmission lines, and 50 feet on either side of the water supply and water disposal pipelines. Nine of the sites and all isolates are prehistoric, eight sites are historical, and at least two represent both periods. Isolates, by definition, are typically not eligible for listing on the National Register of Historic Places and do not require further management. No sites were located within the half-section of BLM land.

Many of the known resource sites have been disturbed or damaged to some extent and most have not been tested prior to forming the preliminary opinions about whether or not they may be eligible for listing on the Register. However, as indicated in the applicant's proposed mitigation measures, regardless of the potential for a known site or resource to be eligible for the Register, these resources should be avoided during earth disturbing activities, project construction and operation (CRI 1999).

Apparently only one site within the APE has been formally determined eligible for the Register, with Office of Historic Preservation (OHP) concurrence. Others may meet the criteria for eligibility for the Register if in situ cultural deposits are present and contain data needed to address important research questions. Condition 17 addresses specific mitigation efforts. In some areas additional testing was recommended to ascertain the presence, extent, and complexity of subsurface deposits to assist in the determination of eligibility. This can be accomplished by manual excavation, carefully controlled mechanical excavation, or some combination of both. Such testing of some resources or deposits outside the limits of the APE, but in the immediate vicinity of construction areas, may be necessary because the presence and boundaries of subsurface deposits have not been

established; therefore, it is possible that portions of some sites in immediate proximity to the APEs could be encountered during construction.

No subsurface testing was done as part of the pre AFC survey effort or site evaluations. Testing was specifically recommended for newly recorded site EHPP-1. The CRI further pointed out that,

“There is a potential for the discovery of subsurface prehistoric archaeological deposits at lower elevations along the northern, eastern, and southern flanks of the Elk Hills. This is due to the apparent concentration of prehistoric and ethnographic settlement in these areas. Portions of the proposed transmission lines and water supply pipeline routes pass through these areas” (EHPP 1999a).

Monitoring and avoidance were recommended, but if impacts are unavoidable, testing would be justified to complete or revise the formal determination of eligibility and thus, the requirement to implement a mitigation program as addressed in CUL-4 and CUL- 19.

BLM has jurisdictional interest in cultural resources on lands crossed by portions of the routes for the water disposal line.

### ***CATEGORIZATION OF IDENTIFIED RESOURCES***

Various laws apply to the treatment of cultural resources. These laws require the Energy Commission to categorize resources by determining whether they meet several sets of specified criteria. These categories then, in turn, influence the analysis of impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

Under federal law, only historic or prehistoric sites, objects or features, landscapes, or architectural resources that are assessed by a qualified researcher as “significant” in accordance with federal guidelines typically need to be considered during the planning process. The significance of an “historic property” which includes both prehistoric and historical sites is judged in accordance with the criteria for eligibility for nomination to the National Register of Historic Places as defined in 36 CFR 60.4. If such resources are determined to be significant, and therefore eligible for listing in the National Register (and automatically for the California Register), they are afforded certain protection under the National Historic Preservation Act and/or CEQA.

Pursuant to 36 CFR. Part 800, to be eligible for the National Register, districts, sites, buildings, structures, and objects are those that possess the quality of significance in American history, architecture (interpreted in the broadest sense to include landscape architecture and planning), archaeology, engineering and culture, and that:

29. are associated with events that have made a significant contribution to the broad patterns of our history; or

30. that are associated with the lives of persons significant in our past; or
31. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
32. that have yielded, or may be likely to yield, information important in prehistory or history.

Title 14, California Code of Regulations, section 4852 indicates that the integrity of a resource is measured by such criteria as the degree to which it retains its location, design, setting, materials, workmanship, feeling, and association.

Under federal law, resources determined not to be significant, that is, not eligible for National Register listing, are subject to recording and documentation only, and are afforded no further protection. However, certain resources, although they may not be assessed as significant, may nonetheless, be of local or regional importance such that mitigation may be warranted regardless of their assessed significance under the federal criteria. Staff reviews the survey reports and site records for any known resources located within or adjacent to the project APE to determine whether they meet the eligibility criteria. Determinations of eligibility are made by the Keeper of the National Register with the concurrence of OHP.

Properties formally determined eligible for the National Register are automatically listed in the California Register of Historical Resources. The state has a similar set of criteria adopted in 1997. However, the NRHP standards have been modified for state use in order to include a range of historical resources which better reflect the history of California. For example, "site" is defined as the location of a significant event, a prehistoric or historic activity, or a building or structure, *whether standing, ruined, or vanished* (Italics added) where the location itself possesses historical, cultural, or archaeological value regardless of the value of any existing building, structure, or object [Title 14, Public Resources Code, section 4800.3 4852 (A.a) (2)]. Also, with regard to integrity, the State has broadened the definitions and judges condition with reference to the specific criteria under which a property is being considered. It accepts that alterations over time, or changes in a property's use, may themselves have historical, cultural, or architectural significance. California explicitly recognizes that "properties may not retain sufficient integrity to meet the criteria for listing on the National Register, but they may still be eligible for listing in the California Register. A property that has lost its historic character or appearance may still have sufficient integrity for the California Register if it maintains the potential to yield important scientific or historical information, or specific data" (section 4800.34852).

The OHP has established status codes, and subcategories to many of them, to be used in the evaluations of sites or structures recorded on Form DPR 523. The basic codes are:

Category 1 - Listed in the National Register of Historic Places;

Category 2 - Formally determined eligible for listing in the National Register;



Category 3 - Appears eligible for listing in the National Register;  
Category 4 - Could become eligible for listing in the National Register; or  
Category 5 - Locally significant.

If the underlying survey meets the State's standards, the OHP will recommend to the State Historical Resources Commission (SHRC) that all properties with a rating of Category 1 through 4 be listed in the California Register. All Category 5 ratings will be reviewed for consistency with the criteria of significance. The SHRC may list properties which are 45 years of age or older.

The record and literature search and the field surveys of the proposed project APE were conducted to identify the presence of any cultural resource sites or materials. Where resources were identified, additional evaluation was conducted to form an opinion about whether the resources appear potentially eligible for listing on the National Register of Historic Places (36 CFR 800). Criteria for the California Register of Historical Resources were not discussed, and the status code boxes on the site record forms (DPR 523) were not filled in. It is not known whether OHP has concurred with all of the evaluations of significance expressed in the AFC (EHPP 1999i).

The CEQA guidelines, Title 14, sections 15126.4 and 15064.5, explicitly require the lead agency (in this case, the Energy Commission), to make a finding of whether a proposed project will affect "historic resources." As used in CEQA, the term "historic resources" includes any property, regardless of age (usually a minimum of 45 years), which satisfies the criteria stated above. If the criteria are met, the Energy Commission must evaluate whether the project will cause a "substantial adverse change in the significance of that historic resource," which the regulations define as a significant effect on the environment. The CEQA guidelines indicate that if an archaeological site is determined to be an historical resource, the limits contained in PRC section 21083.2 do not apply.

Using the above criteria, staff has determined that the cultural resource sites described in the AFC, and in subsequent filings for the Elk Hills project, meet one or more of the criteria for being an historical resource. Isolated finds, by definition do not meet these criteria. Since staff has concluded that the sites for which it is recommending mitigation meet the definition of historical resources, PRC section 21083.2 does not apply to the mitigation discussed in this analysis.

## **IMPACTS**

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Since project development and construction usually entail surface and subsurface disturbance of the ground, the proposed Elk Hills project has the potential to cause an adverse effect on both known and previously unknown cultural resources. Project-related impacts may be categorized in several, inter-related ways. Impacts to cultural resources may either be temporary or permanent effects that could be associated with site preparation, project construction, project operation, and/or project closure. Project-related impacts may also result either directly or indirectly during the pre-construction, construction, operation, and/or closure of the project.

## **TEMPORARY EFFECTS**

Temporary effects occur primarily during those phases of the project associated with disturbance or use of the ground surface during pre-construction vegetation removal and site preparation, and during activities associated with the construction and use of parking or storage areas, conductor pulling sites, or tower laydown sites. Potential adverse changes to a cultural resource may occur if sensitive resource areas are subject to personal or vehicular traffic, parking, or storage because any resources present at the surface could be dislocated or damaged. Typically, once the activity is completed, the potential for impacts is alleviated.

## **PERMANENT EFFECTS**

The potential for permanent effects to occur to cultural resources would be related to such project activities as grading, cutting and filling, excavation, trenching, augering, pile driving, or other pre-construction or construction process which disturbs, removes, or destroys an historic property. Permanent effects may also be caused by damage or disturbance of previously unknown resources that are unexpectedly encountered during earth disturbing activities or construction. Permanent effects on sites within or away from the APE may result from the construction and use of new access roads to an area previously inaccessible, ongoing maintenance to pipelines and other linear facilities, or response to emergency situations.

## **DIRECT IMPACTS**

According to CEQA Guidelines, direct impacts are defined as those impacts that are directly attributable to the project and which occur at the same time and place. Direct impacts are those which may result from the immediate disturbance of resources, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, or excavation.

## **INDIRECT IMPACTS**

Indirect impacts are those which may result from increased erosion as a result of site clearance and preparation, management of the biological habitat, or from inadvertent damage or outright vandalism to exposed cultural materials within or outside of the APE due to increased accessibility to sensitive resource areas.

## **POTENTIAL FOR PROJECT EFFECTS**

The potential for project construction or earth disturbing activities to impact previously unknown cultural resources cannot be fully evaluated until the subsurface soils are exposed by excavation, trenching, and/or augering. A prediction of the potential for discovery of cultural resources can be made, based on the results of literature review and field investigations. The numerous sites already known on or near portions of the project site or the linear facility routes, the recorded occurrence of numerous isolates, and the evidence of human habitation over a period of thousands of years, all on or in proximity to the proposed project indicate that construction of the EHPP has the potential to encounter previously unrecorded cultural resources. Some will have been buried by the natural sedimentation on the flood plain, while surface evidence of others has been

obscured or removed during subsequent or sequential historical uses of the property.

Thus, the potential for EHPP to impact previously unknown cultural resources is directly related to the likelihood that such resources are present, whether they are actually encountered during project development, and the measures set in place to avoid or reduce such impacts to an insignificant level.

## **THE POTENTIAL FOR “ADVERSE CHANGES” TO HISTORIC RESOURCES**

Based upon the Warren-Alquist Act and the Energy Commission siting regulations, the Commission staff must evaluate the potential for significant impacts to cultural resources. Based upon CEQA, staff must evaluate the potential for adverse changes in the significance of historic resources. Not all cultural resources are the same, nor do they offer the same degree of information or insight into past human activities and adaptations to their environment. Many of the important research issues which data from the Elk Hills resources might address are set forth in the CRMP (1998, pages 8-48).

Professional experience, the literature, the records of previously discovered cultural resources, and reference to a regional research design all contribute to the assessment of the importance of a newly discovered site or an unanticipated subsurface resource. Significant cultural resources are those that meet established and generally accepted scientific criteria, or that possess special values to a community or national/ethnic group, contain human remains, or that contribute to an historical landscape. The significance of any cultural resource sites, or materials recovered during project construction, is evaluated by a qualified cultural resource specialist and often can only be assessed after the sites have been mapped and recorded, collected, usually tested, analyzed, and reports prepared by professional archaeologists, historians, architectural historians, industrial specialists, and/or other consultants as the nature of the site may warrant. The actual formal determination of significance is made by the OHP which reviews the findings and forwards potentially eligible resource nominations to the NRHP and/or the California Register.

For the purposes of this analysis, potentially significant impacts to an archaeological, historical, or cultural resource are defined as project impacts which would:

- Demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for the California Register of Historical Resources (CEQA, PRC Section 15064.5);
- Demolish or materially alter in an adverse manner those physical characteristics that account for its inclusion in a local register or historical resources pursuant to local ordinance or resolution (PRC, Section 5020.1(k)), or its identification in a historical resources survey meeting the requirements of

PRC, Section 5024.1(g), unless the preponderance of the evidence demonstrates that the resource is not historically or culturally significant.

The lead agency must address two questions: 1) Is there a significant resource that may be impacted by the proposed project? 2) Will the project cause a substantial adverse change to the extent that the values of the resource which contributed to its importance are impaired or lost? CEQA specifically states that a resource need not be listed on any register to be found significant (PRC Section 21084.1).

The AFC and supplementary filings indicate that a total of 81 cultural resources (72 sites and 9 isolates) have been recorded within the project area, and that 19 sites and 5 isolates are within the defined APE. There is a potential for transmission line Route 1A to impact 8 known sites. One of these, CA-KER-3079/H which contains an historical component and the potential for human remains, has been determined eligible for listing on the NRHP. Three additional eligible sites, whose boundaries have not been established by testing, are within 0.25 miles of Route 1A; one of these, (CA-KER-3080) contains human remains. Route 1B could impact 2 recorded sites, and one eligible site with an historical component (CA-KER-3168/H) is within 0.25 mile. The water supply pipeline, Route 2, could affect 9 sites plus the newly recorded EHHP-1 which has not been evaluated. Some of the known resources were assessed as failing to meet the criterion of integrity based on surface observations, although important information may be present below the surface. Known sites within the 0.25-mile buffer zone, whose boundaries are not known, may extend into the APE, and additional sites may still be encountered when construction begins. Additional testing, analysis, and even re-evaluation must be conducted in the vicinity of such sites if impacts are unavoidable.

Kern County is an area that is extremely rich in both prehistoric and historic resources. Selecting a route that appears not to impact any cultural resource may not be possible. Literature searches and surface surveys are often merely pointers indicating previously identified sites or areas likely to contain cultural resources. A route might be chosen based on the absence of previously recorded sites or the absence of cultural resources identified during field surveys. However, regardless of what has been identified, there is always a possibility of encountering subsurface cultural resources. If the staff's recommended conditions of certification are carefully implemented, it should be possible to successfully mitigate any potential adverse impacts to cultural resources regardless of which routes are selected by the applicant.

The AFC emphasizes that there will be a focus on avoidance of previously recorded sites and revisions suggested in the "Elk Hills Power Project (99-AFC-1) Comments on Preliminary Staff Assessment" emphasize mitigation measures that are to apply to NRHP registered sites. The applicant's approach, which appears to propose to mitigate only registered sites, is of concern to staff.

For this project, the majority of potential impacts to cultural resources would be associated with the pre-construction earth disturbance and construction phase. Since project development and construction usually entail surface and subsurface disturbance of the ground, the proposed EHPP project has the potential to impact

known, as well as previously unknown, cultural resources. However, the normal day to day operation of the EHPP is not expected to have any significant impacts on the region's cultural resources. Staff has proposed mitigation measures that address the potential for impacts to both known and unknown resources. Given the sensitivity of much of the area for the presence of cultural resources, it is likely that additional cultural resources may be discovered during construction. At this time the number of sites that cannot be avoided is unclear. Where the Cultural Resources Specialist has found evidence of cultural resources in sensitive areas, the plan is to avoid them, if possible. Archaeological methods will be used to confirm the presence; define the boundaries, contents, integrity, and research potential; and evaluate the significance of sites, in conjunction with Energy Commission staff.

### ***POWER PLANT AND WATER DISPOSAL FACILITIES***

The power plant site consists of 12 acres near the southwest portion of the total project area. As described in the AFC, the elevation of the proposed plant site slopes gently from an elevation of 1,315 to 1,340 feet above mean sea level (msl). In preparing for project construction, the site will be leveled to an average elevation of 1,330 feet above sea level (EHPP 1999a). Soil in this area has been previously disturbed by oil and gas production, and the site is presently occupied by out-of-service tanks and equipment which will be removed. Excavation for grading, foundations, and underground systems will require the movement and recompaction of approximately 60,000 cubic yards of fill, most of the cutting to take place on the southern area of the plant site, with fill deposited on the north and northeast sides. Grading will entail a maximum cut of 10 feet at the south end, and as much as 4 feet of soil removal for fill areas. After the grade is established, maximum excavation depth for the new power plant foundation is estimated to be 15 feet (EHPP 1999a).

Existing aboveground pipelines will be relocated, and there will be a new paved 600-foot long access road from a new controlled gate at Elk Hills Road (EHPP 1999a). The disposal of wastewater will be managed by a north-south, 6-inch pipeline trending south from the power plant (Route 3), for a distance of 4.4 miles. The flow will be discharged into new disposal wells 4 miles south of the power plant. The sanitary system will be served by a septic tank draining into a leach field whose location is not specified.

### ***NATURAL GAS LINE***

Only one isolate is presently known within 0.25 mile of the power plant footprint or within 50 feet to either side of the short course of Route 4 which extends to the west from the plant site. No impacts are anticipated unless unknown subsurface deposits are encountered.

### ***WATER SUPPLY PIPELINE***

The water supply will be provided by the West Kern Water District (WKWD), conveyed through a new 9.8-mile, 16-inch pipeline (Route 2) extending from the power plant location easterly to the existing facilities of the WKWD. Three dedicated pumps plus one spare pump will be located near the existing WKWD

facilities. The pipeline will be carried above ground from the power plant to approximately MP 5.7, and will continue below grade to the eastern terminus.

Underground pipelines will be approximately 30 inches wide and 5 feet deep. Thirty-two archaeological sites have been recorded within 0.25 mile of the alignment (EHPP1999h Table 3), and nine additional sites are reported to be within 50 feet to either side of the APE (EHPP 1999h, Table 2). Most of those are within or adjacent to the APE are between MP 5.7 to MP 9.8 where the pipeline will be installed underground and are the most likely to be subject to impact.

## **ELECTRIC TRANSMISSION LINE ROUTES**

Two alternative transmission lines have been plotted, with one variation. Access to transmission line structures will be provided by new spurs from existing oil roads. The transmission lines will be strung on single-shaft steel poles rising from 100 feet to 130 feet above grade. The spans between poles are typically 950 feet and may be up to 1300 feet, depending on the terrain and need to accommodate constraints such as road crossings. Transmission pole foundation excavations will be augered to approximately 12 feet with a diameter of approximately 6 feet. For poles placed at angle points or where extra strength is needed, the diameter of the holes needed for the poles may be as much as 12 feet (EHPP 1999b). These poles are typically 950 feet apart, but may be as far as 1225 feet apart.

Construction of concrete pier foundations for the transmission structures will require drilling into the soil to variable depths for each power pole. The depth of soil disturbance will depend on the height and diameter of the individual transmission poles designed for each portion of the route. Typically, the diameter of holes for the power poles would be about 6 feet. The width and extent of surface soil disturbance would depend upon the size of equipment needed to set and erect the poles and the amount of construction work that can be accomplished from existing, disturbed areas or roads.

### ***ROUTE 1A***

Route 1A originates at the plant switchyard and extends for 9.0 miles in a generally eastern direction to the terminus to a new ring bus station. Approximately one-third of the APE was newly surveyed in 1998, the balance being evaluated from prior investigations. There are eight sites and two newly recorded isolates within the Route 1A APE and an additional 14 sites and one isolate within 0.25 mile of the project facilities (EHPP 1999h Tables 2, 3).

### ***ROUTE 1B***

Alternative Route 1B extends from the switchyard in a generally northern direction for a distance of 8.6 miles to Buttonwillow. All of this alignment has been surveyed in 1998. Access will be provided from spur roads from existing oil field roads, and the existing 12 kV distribution circuit will be undergrounded will provide space for the new transmission line. Two sites and one isolate are within the APE, and seven sites and two isolates are between the APE and a distance of 0.25-mile (EHPP 1999h Tables 2 and 3).

## ***ROUTE 1B VARIATION***

The Route 1B variation was added for consideration after completion of the AFC. It exits the power plant on the same path as Route 1B, but diverges at approximately MP 0.2 to run parallel to the west side of 1B at a distance which averages about 500 feet, to the California Aqueduct. This APE was surveyed in August 1999. Cultural remains were encountered which expand the boundaries of one previously recorded site, which will be in the APE of either Route 1B or this variant. Other remains were observed which may be part of a site previously believed to be outside of the APE. Other evidence was found to suggest that one isolate observed during the Route 1B survey is better identified as a site possibly within this variant (EHPP 1999f ).

To the degree that pole placement can be modified, impacts to significant resources may be avoided. When it is desired to change a proposed pole location in order to protect a site, the alternative location will be subject to the same level of survey and further investigation as the primary location, and if the secondary choice would also result in an impact to a significant resource, either another placement should be considered, or mitigating measures implemented.

## ***WASTEWATER DISPOSAL PIPELINE***

The wastewater discharge is conveyed by a six-inch steel pipeline depicted as Route 3. It extends from the power plant in a south-southeast direction for 4.4 miles. The pipeline will be carried aboveground on pipe supports, except where it crosses under Elk Hills Road and Skyline Road in a pipe chase, to new disposal wells 4 miles south of the power plant. There are no recorded sites along this route. No impacts are anticipated unless presently unknown cultural resources are encountered.

## **CUMULATIVE IMPACTS**

Cumulative impacts to cultural resources may occur if increasing amounts of land are cleared and disturbed for the development of multiple projects in the same vicinity as the proposed project.

The Energy Commission has certified one power generation project (La Paloma, Oct. 1999), and is currently reviewing, or anticipates receiving for review, at least four large power generation projects, all proposed for construction in this part of southwestern Kern County. Discussions are underway to consider joint use of rights-of-way for linear facilities. The consolidation and/or the reduction in the number of rights-of-way and facilities would reduce the cumulative impact potential associated with the development of multiple projects in the same general area.

Proposed developments, such as these large power generation projects and associated linear facilities, and ongoing oil field and agricultural production, are extending farther out into the southern San Joaquin Valley. The combined effects of this development can accelerate the potential for continued disturbance of cultural resource sites and the loss of significant information. The level of cumulative impact will grow as increasing development opens more undisturbed

areas and eventually exposes highly sensitive cultural resource sites. There is increasing potential that important resources will be inadvertently lost or destroyed. Implementation of appropriate mitigation measures is essential to the protection of valuable cultural resources and for the recovery of information about such important regional issues. Staff encourages cooperation among project owners to facilitate the protection of such resources, and if this is not technically or economically feasible, to mitigate unavoidable impacts on significant sites.

The incremental effect of this project is likely to contribute to a significant cumulative impact on Routes 1A and 2, which contain the greatest number of sites within the APE. At this time, the process of defining site boundaries and determining site significance is still underway, and the full inventory of significant cultural resources may only be completed during the construction phase of this project. The applicant can mitigate impacts to both undetermined and identified sites to less than significant by staff's proposed mitigation and the conditions of certification.

## **IMPACTS OF FACILITY CLOSURE**

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### **PLANNED CLOSURE**

The anticipated lifetime of the Elk Hills project is expected to be at least 35 years. It is anticipated that upgrades or modifications made prior to the facility's closure might extend the life of the plant. Closure would be caused by either (1) a natural or manmade disaster or economic difficulty, or (2) planned, orderly closure that will occur when the plant becomes economically non-competitive.

At the time of closure, all then-applicable LORS will be identified and the Energy Commission-required closure plan will address compliance with these LORS. Generally, if no additional ground disturbance occurs during closure activities and all conditions of certification have been met, no impacts to cultural resources would be expected. However, actual potential impacts are more likely to depend upon the final location of project structures in relation to existing resources than upon the procedures used for the removal of project structures. Since the spatial relationship between the closure and removal of project structures and sensitive resources cannot be forecast at this time, no conclusion can be drawn at present about the possible impact of facility closure on cultural resources.

### **UNEXPECTED TEMPORARY CLOSURE**

According to the AFC, an emergency unplanned closure would probably be temporary. The applicant's plan, if this type of closure occurs, would be to keep everything ready to resume operations as soon as the emergency is over. In this sort of situation, there is unlikely to be any impact to cultural resources unless emergency response might require traffic over unsurveyed areas or disturbance to sites which had not been considered subject to impact.



## UNEXPECTED PERMANENT CLOSURE

If a site were simply abandoned, impact to cultural resources would be unlikely because there would be no immediate soil disturbances. Alternatively, the removal or demolition of structures, or different use of the land, might affect cultural resources. Over time, depending on the need to disturb the ground to accomplish project closure and facility removal, some disturbance of known and/or previously unknown cultural resources might result.

## MITIGATION

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The AFC indicates that numerous historic and prehistoric sites and numerous isolates have previously been found on the surface within the study corridor of the project area. Since project development and construction usually entail disturbance of the ground surface, as well as disturbance below the surface, the proposed project has the potential for subsurface excavation to encounter buried or obscured cultural resources. The presence of cultural resource materials beneath the surface of the project area is difficult to determine until the ground is opened by excavation, trenching, or augering, so the extent of potential impacts often cannot easily be evaluated prior to construction. The applicant intends to use archaeological methods to determine the presence of sites and avoid them, if possible. Given the number of known prehistoric sites within the project APE, staff recommends that a qualified Native American Observer assist the designated cultural resource specialist in monitoring pre-project site clearing and project construction activities and to advise in the avoidance of sacred sites.

The preferred mitigation for impacts to cultural resources is avoidance of the resource. If previously unknown cultural resources are encountered during site clearance and preparation, or during project construction, and they cannot be avoided, then contingency measures must be in place to react promptly to protect these resources and ameliorate the impacts to a level of not significant. Staff's objective is to ensure that there will be no adverse impacts to significant cultural resources during project development and construction. Critical to the success of any mitigation effort is the selection of a qualified professional cultural resources specialist. The designated specialist must have the authority to halt or redirect work in the vicinity of a site or structure until the resource is identified, evaluated, and treated, if warranted. Energy Commission staff must review the qualifications and approve of the professional archaeologist(s) designated by the project owner to lead and participate in project monitoring, testing, and mitigation efforts. Given the nature of known resources, provision should be made for expertise in both prehistoric and historical archaeology.

Mitigation measures are recommended to reduce the potential for adverse impacts on the region's cultural resources to a less than significant level. While certain types of impacts, such as the demolition of an historical structure or disturbance of human remains, cannot be mitigated to a less than significant level, staff has developed a series of conditions of certification that would help ensure the mitigation of project impacts to the extent possible. The conditions are presented below in the approximate sequence in which they would be implemented and

include specific time requirements to reflect a phased or staged sequence of actions prior to, during, and following project construction.

The proposed mitigation measures are developed to reduce the impacts on important cultural resources to a less than significant level in all areas affected by the project. Sites which are not eligible for the National Register do not require management, but should be avoided if possible. Formal determinations of eligibility have been made for known sites, except for EHHP-1. Mitigation measures are derived from good professional practice, based on the U. S. Secretary of the Interior guidelines and Commission staff recommendations. All of these mitigation measures have been previously proven successful in protecting sensitive cultural resources from construction-related impacts, while allowing the timely completion of many projects throughout California.

## **APPLICANT'S PROPOSED MITIGATION**

The mitigation measures suggested by the applicant emphasize the avoidance of impacts to recorded sites. The applicant states that following the mitigation measures listed below will reduce any potential project construction effects on cultural resources to below the threshold of significance.

### ***MITIGATION MEASURES IN THE AFC***

In the AFC, the applicant recommended a program of mitigation measures that would apply to any known or newly discovered cultural resources within the project APE. These proposed mitigation measures were set forth in the AFC (EHPP 1999a), and are to be incorporated into the (CRMP) to be prepared, as described in the proposed conditions of certification.

The mitigation measures provided in the AFC are summarized as follows:

33. The primary mitigation will be attempting to avoid impacts on recorded sites to the extent feasible. Transmission towers and associated facilities will be located to avoid impacts to recorded sites.
34. If eligible sites on OEHI lands cannot be avoided, OEHI will contact DOE under the License Agreement, so that DOE can implement their PA and CRMP. Prior to construction, sites will be delineated using flagging tape, rope, or other means, to include a 100-foot buffer around the resource. This is intended to be a cultural exclusion zone off limits to construction personnel.
35. Prior to construction, the Project Archaeologist will conduct a worker education session for the construction crew and supervisory personnel to explain the importance of and legal basis for the protection of significant resources. On OEHI lands, construction crews will be trained in the identification, reporting, and preservation of new and old sites.
36. An archaeological monitor will be present at sites along the transmission and water supply corridors when subsurface disturbance is taking place.
37. If a new archaeological resource is discovered during earth disturbing activities or construction and determined to be significant, the Project

Archaeologist will notify the Energy Commission staff and implement a mitigation plan in accordance with the state regulations on private lands and federal regulations on federal lands, as applicable.

38. The Project Archaeologist will arrange for the curation of archaeological materials at a qualified curation facility.

If an archaeological site cannot be avoided by construction or maintenance activities, the project owner will, prior to initiating construction, develop a specific mitigation plan to address the impacts on the resource(s) and submit the plan to the Energy Commission for review. In consultation with Energy Commission staff, the plan will be completed and implemented so as to render any adverse impacts to the significant/eligible resource(s) to less than significant in accordance with CEQA, Energy Commission standards, and other legal requirements.

It is further understood that if human remains should be encountered, either during earth disturbing activities, construction or mitigation activities, work will stop immediately within 50 feet of the discovery and the provisions of the California Health and Safety Code Section 70500.5, Public Resources Code Section 5097.98, and other applicable provisions of Archaeological Resources Protection Act 1979, Native American Graves Protection and Repatriation Act (1990), and other law shall apply.

The AFC concludes that implementation of the foregoing mitigation measures would be effective by either ensuring the avoidance of cultural resources, or by mitigating unavoidable impacts to less than significant (EHPP 1999a).

## ***POST-AFC MITIGATION MEASURES***

After the AFC was filed, the applicant continued to study and evaluate alternative routes for the electrical transmission facilities. A variation to Route 1B was surveyed in August 1999, providing additional information about the archaeological and paleontological environment (EHPP 1999f).

OHP has determined that the following sites are eligible for the National Register:

Site	Content	APE?	Distance to Project Facility	Route	Other
CA-KER-3079/H	Prehistoric and Historical	Yes	APE	1A	Human remains predicted
CA-KER-3080	Human Remains	No	0.25 mi.	1A	
CA-KER-5392	Prehistoric	Yes	0.25 mi	1A	Possible access road
CA-KER-5404	Prehistoric	No	0.25 mi.	1A	
CA-KER-3168H	Prehistoric and Historical	No	0.25 mi.	1B	

Also determined eligible but apparently not within the impact zone are CA-KER-3982, CA-KER-3085/H (also historic; human remains), and CA-KER-5373/H (also historic). Yet to be evaluated are NPR-1 and EHPP-1 which is on Route 2. The presence, integrity, and research potential of subsurface deposits remain largely unknown.

The project will be designed with the intent to avoid cultural resources. If avoidance of any potentially significant cultural resource through project design will not be possible, the significance of that resource must be formally evaluated with respect to the NRHP criteria and eligibility to the California Register. This usually implies subsurface testing, confirmation of boundaries, analysis of the constituents and integrity, and assessment of scientific research potential in support of the conclusion. Appropriate mitigation measures and Section 106 consultation procedures, if necessary, in the event of disagreements, will be followed to consider project effects on potentially affected cultural resources.

The area between MP 7.5 and MP 9.0 of Route 1A contains several areas of particular sensitivity. The sector contains a complex of three sites, including the very large CA-KER-3079 which has been determined eligible. The area between MP 5.4 and MP 6.0 is also sensitive for the presence of two large sites whose boundaries are not tested, one which spans the entire survey corridor and the other apparently closely adjacent to the APE.

Procedures for addressing unanticipated archaeological discoveries were defined in the AFC. Consultation with Energy Commission staff will be carried out to ensure that all appropriate and necessary measures are taken to minimize impacts to cultural resources encountered during construction.

## **BLM'S PROPOSED MITIGATION MEASURES**

Portions of the route proposed for the water supply pipeline route for the EHPP cross lands managed by the US Bureau of Land Management. The staff archaeologist for the BLM at the Caliente Resource Area office in Bakersfield has received a copy of the AFC and the related confidential cultural resource reports prepared by the applicant's consultants. The BLM is reviewing this staff analysis and will provide comments and recommendations regarding cultural resource mitigation and data recovery.

## **STAFF'S PROPOSED MITIGATION MEASURES**

The preferred mitigation for impacts to cultural resources is avoidance of the resource. If previously unknown cultural resources are encountered during site clearance and preparation, or during project construction, and they can not be avoided, then contingency measures must be in place to react promptly to protect these resources and to mitigate any potential significant impacts. Staff recommends that sites, for which significance has not been formally assessed, will be presumed to be important or significant until a determination of significance has been made and reviewed by OHP. The fact that a resource is not listed in or

determined to be eligible for listing in the register does not preclude a lead agency from determining that the resource may be an historical resource.

Energy Commission staff concurs with the mitigation measures proposed in the AFC for the power plant site and related facilities. Staff has suggested additional language to clarify the measures presented by the applicant and other participating agencies. The changes would extend the mitigation contingency planning to address the following aspects in greater detail, including: 1) Energy Commission staff review and approval of the qualifications of professional archaeologists proposed for project monitoring and mitigation efforts; 2) require the presence of a qualified Native American monitor and a specialist in historic or industrial archaeology, 3) recovery of any sensitive cultural resources prior to impact by project activities; 4) recordation and analysis of all pertinent data and scientific information from the site(s) and any recovered cultural resources; 5) curation in a qualified repository, of the data and materials recovered; 6) preparation of recovered materials to the point of identification and completion of an inventory of materials prepared for curation; 7) preparation of a final report on data recovery efforts associated with project mitigation; and 8) filing of pertinent maps, photos, and other information with the curated materials. These measures are incorporated into the conditions of certification specified below.

The proposed mitigation measures would apply to any potential for impacts to sensitive cultural resources in all areas affected by the project. Mitigation measures are derived from good professional practice and they are based on the US Secretary of the Interior's guidelines, and staff's recommendations. The mitigation measures set forth in the conditions have been applied to previous projects before the Energy Commission and they have been proven successful in protecting sensitive cultural resources from construction-related impacts, while allowing the timely completion of many projects throughout California.

### ***PROJECT-SPECIFIC MITIGATION MEASURES***

Rather than setting forth project-specific measures here, staff's recommended mitigation requirements and guidelines have been incorporated into the proposed conditions of certification which follow the text of this staff analysis.

## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSIONS**

The AFC reported an inventory of 72 recorded archaeological sites (26 prehistoric, 43 historical, and 3 multicomponent) plus nine prehistoric isolates within 0.25 mile of the proposed Elk Hills facilities (EHPP 1999h data response 83 and 84, Tables 3 and 3).

Within the APE as defined above, there are 19 sites and five isolates. Given the number of recorded sites and isolates within the 0.25-mile study area, there is a

strong possibility that project construction could encounter additional, potentially significant cultural resources. The presence of isolates on a surface which has been subject to use and modification can sometimes indicate the presence of additional resources below the surface or in proximity to the surface finds.

The analysis of "land disturbance" prepared by Walsh Environmental Scientists and Engineers (EHPP 1999e) dealt explicitly with surface disturbance, and does not mean that the cultural potential of areas regarded as "disturbed" should be automatically ruled out. The archaeological consultant assessed the degree of prior impacts at 56 prehistoric sites, and while available data were variable, the CRMP reported as follows (pages 23-33):

Sites with 0 to 20% disturbance	18
Sites with 20-40% disturbance	5
Sites with 40-60% disturbance	5
Sites with 60-80% disturbance	10
Sites with 80 to 100% disturbance, or not relocated	18
Total	56

A consideration in weighing disturbance from past extraction or production activities is that 41 of the above sites are in low production areas, compared to 12 in high production areas, while three are in agricultural lands (CRMP 1998, Table 2). It is questionable whether two of the prehistoric sites (CA-KER-3200/H and -3210/H) were completely destroyed by the overlying historical component, or whether CA-KER-3255 in agricultural land was "completely destroyed" by livestock grazing. The CRMP further suggested that the so-called prospect pits on six of the sites are "probably World War II military emplacements constructed for the defense of NPR-1" (CRMP 1998, page 33), an association which may be significant.

Of the 19 known recorded sites within the Elk Hills project APE, two (CA-KER-3079/H and 5404) have been determined eligible for listing on the National Register of Historic Places. The 17 other sites have been found ineligible by the OHP and one site (new site recorded EHPP-1) has not been evaluated.

Under CEQA, the Energy Commission is required to make findings as to the presence of historic resources in the area potentially affected by a project and to draw conclusions as to the potential significance of the resources and/or the impacts. Staff has determined that the known resource sites described in the AFC and in the confidential technical reports meet one or more of the criteria needed to identify them as "historic resources." There may be others in the APE yet to be discovered, or even re-evaluated on the basis of subsurface cultural material. Staff has reviewed the discussions of the materials recorded at the various known sites found within 0.25 mile of the project APE. Staff has reviewed the recommendations of the applicant's archaeological specialist and will consider the comments of the BLM archaeologist.

Mindful that there may be changes in the locations of routes or facilities, staff has incorporated the various cultural resource mitigation measures into a proposed set

of conditions of certification for the Elk Hills project. These conditions are set forth as a series of steps or activities that are intended to be completed in a phased sequence, during project-related pre-construction, construction, post-construction, and operation activities. For instance, the preparation of a monitoring and mitigation plan by the designated cultural resource specialist cannot take place until final project design and site maps have been completed, the designated specialist has been approved by the Energy Commission staff's Compliance Project Manager (CPM), and any necessary final surveys have been completed.

The cultural resource conditions of certification are presented as a means of anticipating potential impacts and they are expected to reduce any potential for adverse impacts to historic resources to a less than significant level. An applicant or a project owner frequently anticipates starting project construction as soon as they receive the Energy Commission's decision on certification. It is crucial to recognize that such construction cannot begin until the adopted Conditions of Certification have been complied with. If the start of project construction begins immediately after certification, conditions with extended lead times must be initiated prior to certification.

Staff concludes that construction of the Elk Hills project can be accomplished in a manner that can avoid potential adverse changes to the significance of the known prehistoric resources which were the focus of the CRMP. The potential for adverse changes to subsurface deposits and as yet undiscovered additional sites will remain unknown until, and unless, such resources are encountered. Historical sites in the APE and buffer zone have been evaluated and have been found to lack research potential (PAR Environmental Services, Inc. 1997), although descriptions mention residential and industrial sites, domestic trash deposits, structural remains, and possible military emplacements dating to World War II. Staff believes that if the recommendations and proposed conditions of certification are implemented by qualified professionals in a timely and proper manner, the project will be in compliance with the applicable LORS.

## **RECOMMENDATIONS**

Portions of Route 1A between MP 7.5 and MP 9.0 were identified as being particularly sensitive, and further evaluation and testing may be needed to clarify the potential for the project to affect known resources. As a result of the surveys, the archaeological consultant has also recommended that several of the previously recorded isolates and sites should be combined with boundaries revised or expanded to reflect the new findings.

Staff recommends the designation of a qualified professional cultural resource specialist to implement all cultural resource conditions of certification. Staff also recommends monitoring by the designated specialist throughout the pre-construction and construction periods, as needed, and the implementation of appropriate mitigation measures wherever cultural resources are encountered. Monitoring and mitigation by a qualified cultural resource specialist are essential to reduce the potential for project impacts to cultural resources to a less than significant level. Staff recommends that the designated specialist obtain a qualified

Native American Observer to assist in monitoring pre-project site clearing and project construction activities and to advise in the avoidance of sacred sites. Historical and dual component resources should be examined and evaluated by an historical archaeologist and/or architectural historian who is versed in the method and theory of addressing the significance of historical deposits, structural remains, industrial evidence, and the potential for subsurface resources, and who can identify and date artifacts on the surface or which may be encountered during construction.

Staff recommends that the qualified resource specialist be informed before and during the construction process of mitigating measures implemented by other consultants, for example, the biologist, which have the potential to affect cultural resources which are outside of the surveyed corridors.

Staff recommends that the Energy Commission adopt the following proposed conditions of certification, to ensure mitigation of potential impacts to sensitive cultural resources during the land-disturbing activities associated with construction of the Elk Hills Power Project.

## CONDITIONS OF CERTIFICATION

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**CUL-1** Prior to the start of project-related earth disturbing activities including vegetation clearance, ground disturbance and preparation; and site excavation activities, or the parking or movement of heavy equipment onto or over the project surface, the project owner shall provide the California Energy Commission (Energy Commission) Compliance Project Manager (CPM) with the name and statement of qualifications for its designated cultural resource specialist who will be responsible for implementation of all cultural resources conditions of certification, and for the team member professionally qualified in historic or industrial archaeology.

Protocol: The statement of qualifications for the designated cultural resource specialist shall include all information needed to demonstrate that the specialist meets at least the minimum qualifications specified by the Department of the Interior, as published by the National Park Service, Heritage Preservation Services. Alternatively, the archaeologist shall be qualified by the Register of Professional Archaeologists (ROPA). The minimum qualifications include the following:

39. a graduate degree in, archaeology, cultural resource management;
40. at least three years of archaeological resource evaluation, management, impact mitigation and field experience in California; and
41. at least one year's experience in each of the following areas:
  - a. leading archaeological resource field surveys;
  - b. leading site and artifact mapping, recording, and recovery operations;
  - c. marshaling and use of equipment necessary for cultural resource recovery and testing;
  - d. preparing recovered materials for analysis and identification;



- e. determining the need for appropriate sampling and/or testing in the field and in the laboratory;
- f. directing the analyses of mapped and recovered artifacts;
- g. completing the identification and inventory of recovered cultural resource materials; and
- h. preparing appropriate reports to be filed with the receiving curation repository, the SHPO, and all appropriate regional archaeological information center(s).

The statement of qualifications for the designated cultural resource specialist and the historic or industrial archaeologist shall include:

- 42. a list of specific projects the specialist has previously worked on;
- 43. the role and responsibilities of the specialist for each project listed; and
- 44. the names and phone numbers of contacts familiar with the specialist's work on these referenced projects.

**Verification:** At least one hundred and twenty (120) days prior to the start of project earth disturbing activities, the project owner shall submit the name and statement of qualifications of its designated cultural resource specialist and the historic or industrial archaeologist (including items 1, 2, & 3 above) to the CPM for review and written approval.

Thirty (30) days prior to the start of any ground-disturbing action, the project owner shall confirm in writing to the CPM that the approved designated cultural resource specialist and the historic or industrial archaeologist will be available at the start of earth disturbing activities and is prepared to implement the cultural resources conditions of certification.

At least ten (10) days prior to the termination or release of a designated cultural resource specialist, the project owner shall obtain CPM approval of the replacement specialist by submitting to the CPM the name and resume of the proposed new designated cultural resource specialist.

**CUL-2** Prior to the start of any earth disturbing or earth moving activities, the project owner shall provide the designated cultural resource specialist and the CPM with maps and drawings showing the final project design and site layout, the final alignment of all linear facilities and the location of all auxiliary work areas. The routes for the linear facilities shall be provided on 7.5 minute US Geological Survey (USGS) quadrangle maps. In addition, maps at a scale of 1 inch to 2000 feet should indicate:

- 45. post mile markers (including "tic marks" for tenths of a mile);
- 46. final center lines and right-of-way boundaries; and
- 47. the location of all the various areas where surface disturbance may be associated with trenching or excavation, project-related access roads, storage yards, laydown sites, pull sites, pump or pressure stations, switchyards, electrical tower or pole footings, and any other project components.

Prior to the start of any earth disturbing or earth moving activities, the project owner shall also provide to the cultural resources specialist and the CPM, a current, full set of all archaeological site records for all prehistoric and historical cultural resources within 0.25 mile of the APE.

The designated cultural resource specialist may request, and the project owner shall provide, enlargements of portions of the maps presented as a sequence of strip maps for the linear facility routes. The strip maps would include post mile and tenth of a mile markers and would show the detailed locations of proposed access roads, storage or laydown sites, tower or pole footings, and any other areas of disturbance associated with the construction and maintenance of project-related linear facilities. The project owner shall also provide copies of any such enlargements to the CPM at the same time as they are provided to the specialist.

**Verification:** At least one hundred fifteen (115) days prior to the start of earth disturbing or earth-moving activities on the project, the project owner shall provide the designated cultural resource specialist and the CPM with copies of site records requested above and final drawings and site layouts for all project facilities and maps at appropriate scale(s) for all areas potentially affected by earth disturbing activities or project construction. If the designated cultural resource specialist requests enlargements or strip maps for linear facility routes, the project owner shall also provide a set of these maps to the CPM at the same time that they are provided to the specialist. Any and all changes thereafter should be mapped and provided to the specialists in the weekly meeting referenced in Cul-7 and to the CPM in the Monthly Compliance Report.

**CUL-3** Prior to the start of project related earth disturbing activities, the designated cultural resources specialist, a qualified historical or industrial archaeologist and a qualified (as determined by the cultural resource specialist) Native American monitor shall conduct a reconnaissance survey and any necessary presence/absence testing, data recovery and significance evaluation of the final project site and other areas expected to be affected by pre-construction, construction and operation of the proposed project. Surveys of the linear facilities shall use the centerlines and rights-of-way delineated by the survey stakes placed for final project engineering and design.

During the surveys, potentially sensitive cultural resource areas that must be protected during construction and operation shall be mapped and listed for specific monitoring and/or mitigation measures to be described in the Cultural Resources Monitoring and Mitigation Plan to be prepared per Condition CUL-4, below.

**Verification:** At least 110 days prior to the start of project related earth disturbing activities, the designated cultural resources specialist shall conduct a reconnaissance survey of all areas expected to be affected by construction and operation of the proposed project and its associated linear facilities. Within ten (10) days after completion of the survey, the project owner shall submit a letter

summarizing the dates, methodology and preliminary findings of the survey to the CPM for review.

**CUL-4** Prior to the start of project related earth disturbing activities, the designated cultural resources specialist shall prepare, and the project owner shall submit to the CPM for review and written approval, a Cultural Resources Monitoring and Mitigation Plan (CRMMP), identifying general and specific measures to minimize potential impacts to cultural resources within areas subject to project related earth disturbance.

Protocol: The Cultural Resources Monitoring and Mitigation Plan shall include, but not be limited to, the following elements and measures:

48. A proposed research design for both prehistoric and historical archaeology that includes a discussion of questions that may be answered by the mapping, data and artifact recovery conducted during monitoring and mitigation activities, and by the analysis of recovered data and materials. It shall provide details of the data needed to address the research issues and the methods proposed to obtain such data.
49. A discussion of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the pre-construction, construction, and post-construction analysis phases of the project.
50. Identification of the person(s) expected to perform each of the tasks and description of the mitigation team organizational structure and the inter-relationship of team roles and responsibilities. Specification of the qualifications of any professional team members. The cultural resources team shall include one member professionally qualified in historical or industrial archaeology. This team member shall be available to participate in survey and monitoring and mitigation activities.
51. A discussion of the inclusion of Native American observers or monitors, the procedures to be used to select them, the areas or post-mile sections where they will be needed, and their role and responsibilities.
52. A discussion of measures such as flagging or fencing, to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during pre-construction, construction and/or operation, and identification of areas where these measures are to be implemented. The discussion shall address how these measures will be implemented prior to the start of earth disturbing activities and how long they will be needed to protect the resources from project-related effects.
53. A discussion of where monitoring of project activities is deemed necessary by the designated cultural resource specialist. The specialist will determine the size or extent of the areas where monitoring is to occur and will establish the percentage of the time that the monitor(s) will be present. Identification of the monitoring requirement(s) will include areas where other specialists, e.g., biologists, may be conducting their own mitigating programs.

54. A discussion of the requirement that all cultural resources encountered will be recorded and mapped (may include photos) and all significant or diagnostic resources will be collected for analysis and eventual curation into a retrievable storage collection in a public repository or museum that meets the standards and requirements for the curation of cultural resources as set forth at Title 36 of the Federal Code of Regulations, Part 79.
55. A discussion of the availability and the designated specialist's access to equipment and supplies necessary for site mapping, photographing, and recovering any cultural resource materials encountered during earth disturbing activities or construction.
56. Identification of the public institution that has agreed to receive any data and cultural resources recovered during project-related monitoring and mitigation work. Discussion of the requirements, specifications, or funding needed for the materials to be delivered for curation and how they will be met. Also include the name and phone number of the contact person at the institution.
57. Identification of specific sites within the APE deemed potentially significant, or potentially subject to impact, which may need additional information and recommendations for subsurface testing, boundary definition, assessment by an archaeologist (qualified in prehistory or historical archaeology as appropriate), or concurrence of the existing evaluation by OHP in the light of new information.

**Verification:** At least ninety (90) days prior to the start of earth- disturbing activities on the project, the project owner shall provide the Cultural Resources Monitoring and Mitigation Plan, prepared by the designated cultural resource specialist, to the CPM for review and written approval.

**CUL-5** Prior to the start of earth disturbing or earth moving activities, the designated cultural resources specialist shall prepare an employee training program. The project owner shall submit the cultural resources training program to the CPM for review and written approval.

**Protocol:** The training program shall discuss the potential to encounter cultural resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources.

The training program shall also include the set of resource reporting procedures and work curtailment procedures that workers are to follow if previously unknown cultural resources are encountered during project activities. The training program shall be presented by the designated cultural resource specialist or qualified individual(s) approved by the CPM and may be combined with other training programs prepared for biological resources, paleontologic resources, hazardous materials, or any other areas of interest or concern.

**Verification:** At least sixty (60) days prior to the start of earth disturbing or earth moving activities on the project, the project owner shall submit to the CPM for review and written approval, the proposed employee training program, the set of reporting procedures, and the work curtailment procedures that the workers are to follow if previously unknown cultural resources are encountered during earth

disturbing activities or construction. The project owner shall provide the name and resume of the individual(s) performing the training.

**CUL-6** Prior to the start of earth disturbing or earth moving activities and throughout the project construction period as needed for all new employees, the project owner shall ensure that the designated cultural resource trainer(s) provide(s) the CPM-approved cultural resources training to all project managers, construction supervisors, and workers. The project owner shall ensure that the designated trainer provides the workers with the CPM-approved set of procedures for reporting any sensitive resources that may be discovered during project-related ground disturbance and the work curtailment procedures that the workers are to follow if previously unknown cultural resources are encountered during earth disturbing activities or construction.

**Verification:** Within seven (7) days, after the start of earth disturbing or earth moving activities, the project owner shall provide the CPM with documentation that the designated cultural resources trainer(s) has/have provided to all project managers, construction supervisors, and workers hired before the start of earth disturbing activities the CPM-approved cultural resources training and the set of reporting and work curtailment procedures.

In each Monthly Compliance Report after the start of earth disturbing or earth moving activities the project owner shall provide the CPM with documentation that the designated cultural resource trainer(s) has/have provided to all project managers hired in the month to which the report applies the CPM-approved cultural resources training and the set of reporting and work curtailment procedures.

**CUL-7** The designated cultural resource specialist or the specialist's delegated monitor(s) shall have the authority to halt or redirect earth disturbing activities or construction if previously unknown cultural resource sites or materials are encountered during project-related grading, augering, excavation and/or trenching. Cultural resources monitors shall be members of the approved cultural resources team with a background and experience appropriate to the project area being monitored.

If such resources are found and the specialist determines that they are not significant, the specialist will document the observations and assessment and allow construction to resume, the project owner shall notify the CPM of the find as set forth in the Verification.

If such resources are found and, the specialist determines that they are or may be significant, the halting or redirection of earth disturbing activities or construction shall remain in effect until:

58. the designated cultural resources specialist has notified the CPM of the find and the work stoppage;

59. the specialist, the project owner, and the CPM have conferred and determined what, if any, data recovery or other mitigation is needed; and
60. any necessary data recovery and mitigation has been completed within the immediate area of the discovery.

The designated cultural resources specialist, the project owner, and the CPM shall confer within five working days of the notification of the CPM to determine what, if any, data recovery or other mitigation is needed.

If data recovery or other mitigation measures are required, the designated cultural resource specialist and team members shall monitor earth disturbing and construction activities and implement data recovery and mitigation measures, as needed.

All required data recovery and mitigation shall be completed expeditiously unless all parties agree to additional time.

**Verification:** Thirty (30) days prior to the start of earth disturbing or earth moving activities, the project owner shall provide the CPM with a letter confirming that the designated cultural resources specialist and delegated monitor(s) have the authority to halt earth disturbing or construction activities in the vicinity of a cultural resource find.

For any cultural resource encountered that the specialist determines is or may be significant, the project owner shall notify the CPM within 24 hours unless there is an intervening weekend. If there is an intervening weekend, the project owner shall notify the CPM on the Monday following the weekend.

For any cultural resource encountered that the specialist determines is not significant, the project owner shall notify the CPM within 72 hours after the find and provide written documentation.

**CUL-8** Prior to the start of any earth disturbing or earth moving activity including landscaping, and each week throughout the project construction period, the project owner shall provide the designated cultural resource specialist and the CPM with a current schedule of anticipated monthly project activity. The schedule shall include a map indicating the area(s) where ground disturbing or construction activities will occur two months in advance. The designated cultural resources specialist shall consult daily with the project superintendent or construction field manager to confirm the area(s) to be worked on the next day(s), either by other specialists conducting mitigation measures or the actual processes of project development.

**Verification:** The project owner shall provide the designated cultural resource specialist and the CPM with a week-by-week schedule of the upcoming earth disturbing activities, construction, and mitigation activities, including those to be implemented by other specialists, on or off the project APE, one month in advance, as well as maps showing where each activity is scheduled to take place. These

advance schedules are to be provided to the CPM with the Monthly Compliance Report. The project owner shall notify the CPM when all ground disturbing activities, including landscaping are completed.

**CUL-9** Prior to the start of project-related vegetation clearance; ground disturbance and grading; site or project mobilization; site preparation or excavation activities; implementation of erosion control measures; or the movement or parking of heavy equipment or other vehicles onto or over the project surface, the project owner and the designated cultural resources specialist shall consult with Native American tribal representatives to identify affected tribes or bands and to develop an agreement(s) for qualified (as determined by the cultural resources specialist) Native American monitors to be present throughout the project pre-construction surveys and construction phase of the project.

**Verification:** At least thirty (30) days prior to start of project-related vegetation clearance; ground disturbance and grading; site or project mobilization; site preparation or excavation activities; implementation of erosion control measures; or the movement or parking of heavy equipment or other vehicles onto or over the project surface, the project owner shall provide the CPM with a copy of all finalized agreements for Native American monitors.

**CUL-10** Throughout the pre-construction reconnaissance surveys and the monitoring and mitigation phases of the project, the designated cultural resources specialist or delegated monitor(s) shall keep a daily log describing the area and nature of work, any resource finds and the progress or status of the resource monitoring, mitigation, preparation, identification, and analytical work being conducted for the project. The daily logs shall indicate by tenths of a post mile, where and when monitoring has taken place, where monitoring has been deemed unnecessary, and where cultural resources were found.

The designated specialist shall prepare a weekly summary report on the progress or status of cultural resource-related activities.

The designated resource specialist and delegated monitor(s) may informally discuss the cultural resource monitoring and mitigation activities with Commission technical staff.

**Verification:** Throughout any earth disturbing activity and the project construction period, the project owner shall include in the Monthly Compliance Reports (MCR) to the CPM, copies of the weekly summary reports prepared by the designated cultural resource specialist, regarding project related cultural resource monitoring.

**CUL-11** The designated cultural resource specialist or designated monitor(s), shall be present at all times the specialist deems appropriate to monitor

construction-related grading, excavation, trenching, augering, or other disturbance of existing surface in the vicinity of previously recorded archaeological sites and in areas where cultural resources have been identified.

**Protocol:** If the designated cultural resource specialist determines that full-time monitoring is not necessary in certain portions of the project area or along portions of the linear facility routes, the designated specialist shall notify the project owner of the changes. The designated cultural resource specialist shall use post-mile markers and boundary stakes placed by the project owner to identify areas where monitoring is being reduced or is no longer deemed necessary.

**Verification:** During any earth disturbing activities and throughout the project construction period the project owner shall include in the Monthly Compliance Reports to the CPM copies of the weekly summary reports prepared by the designated cultural resource specialist regarding project-related cultural resource monitoring.

**CUL-12** The project owner shall ensure that the designated cultural resource specialist obtains and maintains a current US Bureau of Land Management (BLM) Archaeological Resource Use Permit to gain access to lands managed by the BLM or other federal agencies, to conduct any surveys, monitoring, data and/or artifact recovery activities on these lands. This use permit is to be obtained from the area office of the BLM in Bakersfield, California, no less than (10) days prior to the start of cultural resource activities governed by the permit.

**Verification:** The project owner shall provide the CPM and the designated BLM representative(s) with a copy of the BLM archaeological resource use permit received by the designated cultural resource specialist, in the next Monthly Compliance Report following its receipt or renewal.

**CUL-13** The project owner shall ensure that the designated cultural resource specialist meets the professional qualifications specified by the BLM; that the Cultural Resources Monitoring and Mitigation Plan prepared per Energy Commission Condition CUL-4, also reflects BLM requirements for an Archaeological Resource Treatment Plan; and that all surveys, monitoring, and data and/or artifact recovery activities implemented during the construction and operation of the Elk Hills project.

**Verification:** In each Monthly Compliance Report, the project owner shall provide the CPM with a summary outlining the measures it has taken to ensure that it has met both BLM and Energy Commission requirements.

**CUL-14** The project owner shall ensure that the designated cultural resource specialist performs the recovery, preparation for analysis, analysis,



preparation for curation, and delivery for curation of all cultural resource materials encountered and collected during pre-construction surveys and during the monitoring, data recovery, mapping, and mitigation activities related to the project.

**Verification:** The project owner shall maintain in its compliance files, copies of signed contracts or agreements with the individuals, companies, or institutions which will ensure the necessary recovery, preparation for analysis, and analysis of cultural resource materials collected during data recovery and mitigation for the project. The project owner shall maintain these files for the life of the project and the files shall be kept available for periodic audit by the CPM. Information as to the specific location of sensitive cultural resource site shall be kept confidential and accessible only to qualified cultural resource specialists.

**CUL-15** Following completion of data recovery and site mitigation work, the project owner shall ensure that the designated cultural resources specialist prepares a proposed scope of work for the final Cultural Resources Report. The project owner shall submit the proposed scope of work to the CPM for review and written approval.

**Protocol:** The proposed scope of work shall include (but not be limited to):

61. a discussion of any analysis to be conducted on recovered cultural resource materials;
62. a discussion of possible results and findings,
63. proposed research questions which may be answered or raised by analysis of the data recovered from the project; and
64. an estimate of the time needed to complete the analysis of recovered cultural resource materials and prepare the Cultural Resources Report.

**Verification:** The project owner shall ensure that the designated cultural resources specialist prepares the proposed scope of work within ninety (90) days following completion of the data recovery and site mitigation work. Within seven (7) days after completion of the proposed scope of work, the project owner shall submit it to the CPM for review and written approval.

**CUL-16** The project owner shall ensure that the designated cultural resources specialist prepares a Cultural Resources Report. The project owner shall submit the report to the CPM for review and written approval.

**Protocol:** The Cultural Resources Report shall include (but not be limited to) the following:

65. For all projects:
  - a. a description of pre-project literature search, surveys, and any testing activities;

- b. maps of showing areas surveyed or tested;
  - c. a description of any monitoring activities;
  - d. maps of any areas monitored; and
  - e. conclusions and recommendations.
66. For projects in which cultural resources were encountered, include the items specified under “1” and also provide:
- a. site and isolate records and maps;
  - b. a description of testing for, and determinations of, significance and potential eligibility; and
  - c. a discussion of the research questions answered or raised by the data from the project.
67. For projects regarding which cultural resources were recovered, include the items specified under “1” and “2” and also provide:
- a. a description of the methods employed in the field and laboratory;
  - b. description (including drawings and/or photos) of recovered cultural materials;
  - c. results and findings of any special analyses conducted on recovered cultural resource materials;
  - d. an inventory list of recovered cultural resource materials;
  - e. interpretation of the site(s) with regard to the research design; and
  - f. the name and location of the public repository receiving the recovered cultural resources for curation.

**Verification:** The project owner shall ensure that the designated cultural resources specialists completes the Cultural Resources Report within ninety (90) days following completion of the analysis of the recovered cultural materials. Within seven (7) days after completion of the report, the project owner shall submit the Cultural Resources Report to the CPM for review and written approval.

**CUL-17** The project owner shall submit an original, an original-quality copy, and a computer disc copy of the CPM-approved Cultural Resource Report to the public repository to receive the recovered data and materials for curation (or other format to meet the repository’s requirements), with copies to the State Historic Preservation Officer (SHPO) and to the appropriate regional archaeological information center(s). The disc files must meet SHPO requirements for format and content.

**Protocol:** The copies of the Cultural Resource Report to be sent to the curating repository, the SHPO, and the regional information center(s) shall include the following (based on the applicable scenario (1, 2, or 3) set forth in Cul-16):

68. originals or original-quality copies of all text;
69. originals of any topographic maps showing site and resource locations;
70. originals or original-quality copies of drawings of significant or diagnostic cultural resource materials found during pre-construction surveys or during project-related monitoring, data recovery, or mitigation; and
71. photographs of the site(s) and the various cultural resource materials recovered during project monitoring and mitigation and subjected to post-recovery analysis and evaluation. The project owner shall provide the curating repository with a set of negatives for all of the photographs.

**Verification:** Within thirty (30) days after receiving approval of the Cultural Resources Report, the project owner shall provide to the CPM documentation that the report has been sent to the public repository receiving the recovered data and materials for curation, the SHPO, and the appropriate archaeological information center(s).

For the life of the project the project owner shall maintain in its compliance files copies of all documentation related to the filing of the CPM-approved Cultural Resources Report with the public repository receiving the recovered data and materials for curation, the SHPO, and the appropriate archaeological information center(s).

**CUL-18** Following the filing of the CPM-approved Cultural Resource Report with the appropriate entities, the project owner shall ensure that all cultural resource materials, maps and data collected during data recovery and mitigation for the project are delivered to a public repository that meets the US Secretary of the Interior standards for the curation of cultural resources. The project owner shall pay any fees for curation required by the repository.

**Verification:** The project owner shall ensure that all recovered cultural resource materials are delivered for curation within thirty (30) days after providing the CPM-approved Cultural Resource Report to the public repository receiving the recovered data and materials, to the SHPO, and to the appropriate archaeological information center(s).

For the life of the project, the project owner shall maintain in its project history or compliance files, copies of signed contracts or agreements with the public repository to which the project owner has delivered for curation all cultural resource materials collected during data recovery and mitigation for the project.

**CUL-19** Prior to transmission line earth disturbing activities and construction, the project owner shall:

72. Design the transmission line in the areas cited to span the sensitive cultural resource site areas.
73. In the area between MP 5.0 to MP 6.0 and MP 7.5 to MP 9.0 of Route 1A, if it is not possible to span potential cultural resources, at each area of ground disturbance, the cultural resource specialist will survey the area. The survey

will determine with appropriate methods whether the site represents a potentially significant cultural resource or has been formally determined not to be eligible.

74. To determine the presence or absence of subsurface deposits, the cultural resources specialist will conduct a detailed surface examination of an area 100 feet in diameter around the pole site. If cultural materials are found to be present, the designated cultural resource specialist will conduct an excavation at the center of the pole site. The preferred means of excavation will include a hand excavation unit 1-meter by 1-meter using archaeological methods and techniques. However, if deemed appropriate by the cultural resource specialist, the excavation may be conducted using auger or backhoe.
75. If sensitive cultural resources are located in situ, the pole site shall be moved to a new location, and that alternate location will be surveyed and tested, if necessary, to insure that there are no sensitive cultural resources present. If it is not possible to move the pole site, the designated cultural resources specialist will design and implement mitigation measures, i.e., data recovery according to the research design.
76. In areas where human remains may be unearthed, a representative of the Native American Community shall be requested to be on site during excavations and earth disturbing activities.

**Verification:** The project owner shall include information about the activities related to this condition in the weekly summary of the designated cultural resource specialist's daily log submitted to the CPM in the Monthly Compliance Report.

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# **SOCIOECONOMICS**

Testimony of Joseph Diamond<sup>1</sup>

## **INTRODUCTION**

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Generally, a California Energy Commission (Energy Commission) staff socioeconomic impact analysis evaluates the project induced changes on community services and/or infrastructure and related community issues such as environmental justice and facility closure. Direct, indirect, and cumulative impacts are also included. This analysis discusses the potential impacts of the proposed Elk Hills project on local communities, community resources, and public services, pursuant to Title 14, California Code of Regulations, Section 15131.

## **LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)**

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The following LORS are applicable to the Elk Hills power project:

### **FEDERAL**

Executive Order 12898, "Federal Actions to address Environmental Justice (EJ) in Minority Populations and Low-Income Populations." The order focuses federal attention on the environment and human health conditions of minority communities and directs agencies to achieve environmental justice as part of this mission. The Executive Order requires the US Environmental Protection Agency (EPA) and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this problem. Agencies are required to identify and address any disproportionately high and/or adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations. The Energy Commission receives federal funds and is thus subject to this Executive Order.

### **STATE**

#### ***CALIFORNIA GOVERNMENT CODE, SECTION 65996-65997***

As amended by SB 50 (Stats. 1998, ch. 407, Sec. 23), states that public agencies may not impose fees, charges or other financial requirements to offset the cost for school facilities.

### **LOCAL**

#### ***KERN COUNTY GENERAL PLAN***

Public facilities component pertinent to socioeconomics.

(Policy No. 8) In evaluating a development application, Kern County will consider impacts on the local school districts.

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<sup>1</sup> The cumulative impacts section is a joint product of Dale Edwards and Joseph Diamond.

(Implementation E) Determine the local cost of facility and infrastructure improvements and expansion which are necessitated by new development of any type and prepare a schedule of charges to be levied on the developer at the time of approval of the Final Map.

## **SETTING**

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Elk Hills is located in the rural oil fields of western Kern County. For a full description of the socioeconomic setting, please refer to the Project Description section of this document and the project description and location (5.1-Introduction and 5.8.1.1-Project Area) in the Elk Hills AFC, Vol. I., February 1999 (EHPP 1999a). The study area (affected area), defined by Elk Hills Power, LLC (EHP) in the socioeconomics section of the AFC, includes: western Kern County, Bakersfield, Buttonwillow, Maricopa, McFarland, McKittrick, Taft, Shafter, and Wasco. These communities are within a one-way commute distance of the power plant site where construction and operations workers may live.

## **IMPACTS**

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Staff reviewed the Elk Hills AFC, Vol. I, February 1999, socioeconomic section (EHPP 1999a) regarding potential impacts to community services and infrastructure (i.e., employment, housing, schools, utilities, emergency and other services), and environmental justice. Based on its analysis and the socioeconomic data provided and referenced from governmental agencies and trade associations, staff finds the AFC's socioeconomic analysis acceptable and agrees with its conclusions with the exception of the cumulative impacts on schools and the fire department which are described herein.

Fixed limits are used in housing (a 5 percent or less of permanent available housing) and EJ, which has a threshold of 50 percent for minority/low-income population. Criteria for subject areas such as fire protection, water supply and waste water disposal are handled in other sections. Educational impacts are subjectively determined but are moot, as described later in the testimony. And finally, impacts such as medical services, law enforcement, or community cohesion are based on subjective judgements or input from local and state agencies.

Greater non-local employment has the potential for resulting in significant impacts.

## **EMPLOYMENT**

The results of population dispersion, as presented by Elk Hills in the AFC, are that 70 percent of the non-local construction workers (approximately 49 workers at peak construction) are expected to live in Bakersfield. These are results that staff would expect because more amenities are available in Bakersfield when compared to the communities closer to the project site. Furthermore, the results indicate that approximately 20 percent or 13 workers will likely live in Taft or Maricopa, 10 percent or about 7 workers will likely live in Shafter or Wasco; and about one worker will live in another area of Kern County or Southern California.

The Impact Analysis For Planning (IMPLAN) model (an input-output model), used in the AFC by Elk Hills to estimate employment impacts from the Elk Hills project on the affected area, is widely used and acceptable to staff. The University of California at Berkeley uses the IMPLAN model for regional economic assessment, and it has been used to assess other generating projects in the area. It is a common regional economic tool. In general, most multipliers are estimated by showing the total change divided by the initial change. Employment multipliers refer to the total additional employment stimulated by the new economic activity. IMPLAN is a disaggregated type of model which divides the (regional) economy into sectors and provides a multiplier for each sector (Lewis et al. 1979). The employment multipliers used by La Paloma were also applied to Elk Hills (3.23 for construction e.g., each new construction job supports approximately 2.2 indirect and induced jobs in the regional economy and 2.88 for operations with approximately 1.88 indirect and induced jobs in the regional economy (La Paloma 1998)) and are within an acceptable range of 2 often cited by many economists. The 2.88 multiplier for operations is based on a large electrical facility, the Midway-Sunset power plant, in Kern County (Smith 1999).

Project construction (power generation, electric power transmission, and pipelines for fuel gas, water supply and waste water) is expected to occur over a 15 month period. The peak construction, when the highest number of workers will be needed, is expected to occur in the 8th month of construction. The greatest number of construction workers, estimated to be 352 workers, will be needed in the 8th month of construction. Approximately 282 of these workers are expected to come from the communities in the affected area, and approximately 70 are expected to relocate from communities outside of the two-hour commute radius.

The number of construction workers needed outside of the peak construction period will range from fewer than 11 in the first month of construction to approximately 124 workers in the 15th month of construction. The average number of non-local workers needed for power plant construction is estimated to be 48. During operation of the project, about 20 workers will be needed to maintain and operate the project. Approximately 8 (40 percent) of these operations workers may be non-local in a worst-case scenario estimate according to Elk Hills.

The total employment, estimated by Elk Hills, using an IMPLAN multiplier of 3.23 for construction, is the equivalent of 785 jobs (which includes 540 secondary jobs), based on an average of 243 project-related construction jobs. For project operations, an average of 20 jobs with an IMPLAN multiplier of 2.88 for operations results in an equivalent of 58 total jobs (which includes 38 secondary jobs).

## **HOUSING**

Permanent housing is considered to be in short supply if the vacancy rate is less than five percent (Cleary 1989). As of January 1998 (See Table 5.8-2 of the Elk Hills AFC), approximately 81,932 housing units existed in Bakersfield, 413 in Buttonwillow, 20 in McKittrick, 3,364 in Shafter, 4,114 in Wasco, 2,405 in Taft, 2,076 in McFarland, and 455 in Maricopa. There are approximately 94,779 total housing

units in these communities which are within a two-hour commute. The vacancy rate for this housing averages approximately five percent. Therefore, approximately 4,739 single-family, multi-family and mobile homes are available. In addition, there are approximately 5,789 total motel/hotel rooms in four of the six communities, with the availability being about 30 percent on average or 1,737 rooms (EHPP 1999a). The combination of housing and motel/hotel rooms probably available to non-local construction and operations workers for this project is more than sufficient for worker needs.

## **SCHOOLS**

Based on an average of 48 non-local construction workers and 8 non-local plant operating personnel, 43 (not 41 as estimated in the AFC) school-aged children for plant construction and 12 school-aged children for plant operation are estimated to be added to the affected area schools with 70 percent going to Bakersfield. According to Table 8.8-14 in the AFC, six of thirteen affected area high schools are over capacity. In most cases, schools in western Kern County, west of Bakersfield, appear to be well below capacity. The addition of project-related children to schools that are at- or over-capacity may increase costs in terms of supplies, equipment and/or teachers but the impact will be small. However, according to Senate Bill 50, enacted in 1998, which amended section 17620 of the Education Code, school funding is restricted to property taxes and statutory facility fees collected at the time the building permit is acquired (i.e., not more than \$.31 per square foot of commercial and industrial chargeable and covered or enclosed space) (Govt. Code, Sec. 65995 (b)(2)). The limit of \$.31 shall be increased in year 2000 and every two years thereafter (SCPP 1999a1, AFC page 8.8-1). Public agencies may not impose fees, charges or other financial requirements to offset the cost for "school facilities." School facilities are defined as "any school-related consideration relating to a school district's ability to accommodate enrollment." Local and state agencies are precluded from imposing (additional) fees or other required payments on development projects for the purpose of mitigating possible enrollment impacts to schools according to SB 50 in 1998.

The life of the Elk Hills power plant is estimated by Elk Hills in the AFC to be a minimum of 30 years. Property taxes on the plant have been estimated to be \$20 million in the first ten years for use on infrastructure and services such as schools, government, and social programs and services with about \$8,576,260 allocated to education (EHPP 1999a, pages 5.8-18&19).

## **UTILITIES, EMERGENCY AND OTHER SERVICES**

The West Kern Water District (WKWD) can meet the project's water supply needs. There are abundant electric supply options available for construction. During construction or operation, the project is not expected to place significant demands on the Kern County Fire Department, Sheriff, or the Mercy Westside District Hospital.

## **FINANCIAL**

Elk Hills estimates (EHPP 1999a, AFC pages 5.8-17&18) that the construction payroll will be \$43 million (1999 dollars) for 15 months, and the operation payroll will

be \$2 million (1999) dollars with \$3 million for local supplies annually during operations, thereby generating additional sales tax revenue of about \$217,000 annually. Elk Hills estimates that \$25 million worth of materials and equipment will be purchased locally for construction. This spending will generate sales tax revenues for the local jurisdiction, about one percent for the county, and about 6.25 percent for the State, for a total of 7.25 percent. This translates to approximately \$1.8 million in sales tax revenue. However, Kern County has granted Elk Hills a \$4.0 million tax incentive from County tax revenues in May 1999 to reimburse the cost of building "public infrastructure" such as roads and street lighting. (Bedell 1999)

## **ENVIRONMENTAL JUSTICE**

The EJ screening analysis contained in the Elk Hills AFC (EHPP 1999a, AFC pages 5.8-22 to 5.8-23) is consistent with the federal EJ guidelines, and the analysis is acceptable to staff. According to the federal EJ guidelines, a minority or low-income population exists if the minority or low income population percentage of the affected area is fifty percent or greater of the affected area's general population.

The EJ analysis in the AFC indicates that the affected area's minority population is less than 50 percent. Only McFarland and Wasco have Hispanic populations of 70 and 54 percent, but are located 50 and 35 miles from the project (EHPP 1999a, AFC pages 5.8-19&20). According to the data presented in Table 5.10-2 in the La Paloma AFC, 31 percent of the affected area population is non-white, based on 1990 US Census Data. The data is the same for Elk Hills since the total affected area is the same. More recent minority population data for the total affected area was not available. However, using estimated 1998 minority and total population data for Bakersfield (LPGP 1998, AFC Table 5.10-2, 5.10-6), the growth area of Kern County, staff concludes that the affected area, estimated at 34 percent, would still fall below the 50 percent threshold required to establish EJ as an issue. In addition, the highest low-income population percentages are for McFarland and Wasco, at 27 percent respectively. Therefore, further EJ analysis is not necessary.

## **CUMULATIVE IMPACTS**

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Cumulative impacts might occur when more than one project has an overlapping construction schedule that creates a demand for workers that can not be met by local labor, resulting in an influx of non-local workers and their dependents. At the time of filing of the Elk Hills AFC in February 1998, four other power plant projects were identified in the vicinity of the Elk Hills project. The Elk Hills AFC included a discussion of cumulative impacts and concluded that there were none of significance.

Several power plant projects in western Kern County have either filed AFCs or are expected to soon. La Paloma filed their AFC on July 15, 1998 and the project was approved on October 6, 1999. The Sunrise Cogeneration and Power Company (SCPC) filed an AFC on December 21, 1998 for a 320 MW cogeneration project which will be located near the community of Fellows. Elk Hills Power Plant Project filed an AFC on February 24, 1999 for a 500 MW combined cycle power plant to be

located at Elk Hills. An AFC for Pastoria was filed on November 30, 1999 and an AFC will be filed in December 1999 for Midway-Sunset West.

SOCIOECONOMICS Table 1 shows the estimated number of workers by month for the estimated construction schedules for each of the power plant projects identified above. There are approximately four months that the five projects will have overlapping construction schedules. During this period, the total number of workers needed for all five projects ranges from approximately 1,335 to over 1,395 . As of October 1999, the number of unemployed workers in the Kern County labor force was 37,400 out of a total civilian labor force of 282,600 or 9.1 per cent (State of California – Employment Development Department, preliminary data, 1999).

Staff agrees that Elk Hills will primarily draw on the local labor force for construction and operation. No significant influx of permanent employee or secondary employment households is expected due to Elk Hills because Kern County has a large available labor pool. With the addition of each subsequent project into the construction phase, the ability of the available local labor force to meet project construction needs decreases. The cumulative need for workers in particular crafts or specialties will exceed the availability of workers in those crafts in the local area at different times based on the numbers of specialists available and the total number of specialists needed. Each of the currently filed projects has identified their forecast for local vs. non-local workers based on the available work force by craft and their estimate of worker availability based on other project needs.

La Paloma, likely the first of the five projects to start construction, estimates that 86 and 14 percent of their average worker needs will be supplied by local and non-local workers, respectively. For peak construction, the percentages remain relatively unchanged. Sunrise's estimates are basically the same as La Paloma's. The Elk Hills AFC estimates 80 percent local and 20 percent non-local construction workers for average and peak periods. Pastoria's AFC estimates 92 percent local and eight percent non-local construction workers for an average period and about four percent non-local construction workers for the peak period. These estimates for local verses non-local workers are consistent with the availability of general construction laborers and the availability of workers in specific crafts in Kern County. There is sufficient housing available in Bakersfield and other communities closer to the project sites to meet all non-local worker needs.

**SOCIOECONOMICS Table 1**  
**Cumulative Construction Workers (Estimated)**

	<b>La Paloma</b>	<b>Sunrise*</b>	<b>Elk Hills</b>	<b>Midway- Sunset West**</b>	<b>Pastoria</b>	<b>Total</b>
<b>Year 1999</b> Dec						
<b>Year 2000</b> Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	   53 76 146 222 304 403 467 555 597 637	   64 75 96 142 157 197 233 241 255 237	     111 128 142 195 241 306	             	             	   117 151 242 364 572 728 842 991 1093 1180
<b>Year 2001</b> Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	 665 714 729 699 625 521 399 195 141	 213 193 124 104 78	 333 352 347 329 317 310 231 158 124	  111 128 142 195 241 306 333 352 347 329 317	 25 25 55 80 120 180 275 260 270 275 325 330	 1236 1395 1383 1354 1335 1252 1211 946 887 622 654 647
<b>Year 2002</b> Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec				 310 231 158 124	 365 340 295 295 280 240 175 130 60 40 40 50	 675 571 453 419 280 240 175 130 60 40 40 50

\* Does not include the natural gas supply pipeline and water supply pipeline workers.

\*\* AFC not yet filed. The number of workers are estimated, based on generating capacity of the project, compared to the four projects that have filed AFCs.

Based on an average of approximately 1,367 workers during the four months of overlapping construction for all five projects, and using an IMPLAN construction multiplier of 3.23, approximately 3,048 secondary jobs are expected to result during

that period. Staff does not expect a significant number of these jobs to be filled by non-local workers because these jobs are expected to be temporary, coincident with the construction schedule, and salaries associated with indirect and induced jobs generally do not attract new workers to an area. Over a period of approximately 25 months, secondary jobs, related to the construction of two or more of these projects at the same time, are expected to range from approximately 178 to 3,111.

Using an IMPLAN operation multiplier of 2.88, secondary jobs expected from the operation of the projects range from 111 for two projects to 233 for all five projects (based on estimates of 59 employees for La Paloma and Sunrise projects, and 124 employees for all five projects). These secondary jobs are estimated to be filled from the local work force.

Based on an estimated average of 189 non-local workers for all five projects during construction, and assuming the average family size to be 2.91 persons (State of California, Department of Finance 1998), approximately 172 children are estimated to be added to Kern County schools. These children will not enter and leave the schools at the same time. During operation of the five projects, approximately 48 children are estimated to be added to western Kern County schools as a result of non-local workers relocating their families. The increase in school enrollments due to the five projects during construction will cause a potential significant socioeconomic impact on those schools in the Bakersfield area that are currently at or over-capacity. However, the increase in school enrollments due to the five projects during operation is not expected to cause an impact because students will attend many schools that are under-capacity and the number is relatively small. Indeed, many non-local workers may not bring their children so the estimates could be high. Schools that are expected to handle more students are expanding their overall capability to meet needs and school impacts fees and property taxes will help fund education.

The Kern County Fire Department (KCFD) provides emergency medical response for the proposed power plants. The KCFD believes that it has adequate resources to provide emergency medical response for the five power plants that have been identified in this cumulative analysis.

The KCFD fire fighting resources are sufficient to cover all five of the proposed power plant projects. However, the fire department has identified a need for one new ladder truck to maintain its current level of service and to effectively respond to the types of emergency incidents that occur at facilities such as the proposed power plants. Specifically, the fire department sees an increase in the number of emergency responses that will require High Angle and Confined Space Specialist Technicians and equipment. The fire department requires one new, properly equipped, ladder truck that will be assigned to Station 21 at Taft, nine new personnel to cover three work shifts per day, and a replacement ladder truck approximately 15 years in the future.

Currently, the County has three ladder trucks, two in service and one as a backup. All three trucks are located in the metropolitan Bakersfield area. The closest ladder truck is about 40 miles away from the four power plants proposed for western Kern



County. This distance makes dispatching to the area where the power plants are planned unacceptable due to the excessive response time.

The KCFD estimates the cost of a new, properly equipped, ladder truck to be \$700,000, the cost of the first year's funding for the nine new personnel to cover three shifts per day for the ladder truck to be \$750,000, and the cost for the first year of a ladder truck replacement fund to be \$75,000. Staff believes these costs should be paid by La Paloma which was approved on October 6, 1999 and the three power plant projects currently proposed for western Kern County (Sunrise, Elk Hills and Midway-Sunset West) that will benefit directly from the new ladder truck. Because full property tax payments for these new power plants will not begin until approximately 18 months after start of construction, the fire department will require up-front payments from each of the power plant owners to cover the costs for the new ladder truck, staff for the truck, and the replacement truck fund.

The KCFD estimates that the new ladder truck will take nine months to be delivered once ordered. The need for the new ladder truck begins with the start of construction of the second power plant in western Kern County. Current estimates are that construction of the second power plant will begin approximately March 2000.

Staff is aware that La Paloma, LLC has signed an agreement with the KCFD on funding for the three items the fire department has identified as resource needs. This agreement involves up-front payments by La Paloma for the new truck, staffing and replacement truck fund. La Paloma will then be reimbursed by the County and/or the other power plant owners as appropriate.

According to the KCFD (Chaffin 1999), the fire department estimates that the Fire Fund share of the property taxes paid by the four projects expected in the Taft area will be approximately \$1,371,500 per year. This amount is based on the estimated property tax payments described in the AFCs for the La Paloma, Sunrise and Elk Hills projects. Taxes for the Midway-Sunset West project were estimated based on the Elk Hills project (both are 500 MW projects).

The State Board of Equalization, at an April 21, 1999 Property Tax Committee meeting, formally decided to assess only power generating facilities with a Certificate of Public Convenience and Necessity (CPCN) using unitary valuation and allocation of revenues on a countywide basis. Thus, local collection and distribution of property taxes will apply to the Elk Hills project and other power plant projects proposed for Kern County.

The Kern County Sheriff will provide police service for the five new projects, and existing resources are expected to be adequate to meet law enforcement needs during construction and operation of the five projects. Westside District Hospital serves the area for four of the five new projects, and their facility is expected to adequately meet medical service needs during construction and operation of the five new projects along with emergency services from the Kern Fire Department.

## **FACILITY CLOSURE**

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### **PLANNED CLOSURE**

The Elk Hills AFC (see Facility Closure 3.10, pp. 3-71 to 3-73) provides for the inclusion of socioeconomic LORS which will be incorporated into the facility closure plan when it becomes necessary at the end of the project's economic life. The socioeconomic impacts of facility closure will be evaluated at that time.

### **UNEXPECTED TEMPORARY CLOSURE**

Any unexpected, temporary closure would not likely cause any significant environmental impacts on the affected area, because the likely result of a temporary closure would be reactivation of the power plant by the same or a new owner within a relative short period of time. Personnel changes may occur if there is an ownership change, but socioeconomic impacts would not change significantly because the number of operating personnel would remain relatively the same.

### **UNEXPECTED PERMANENT CLOSURE**

Any unexpected, permanent closure of the Elk Hills project would not likely cause any significant socioeconomic impacts on the affected area, because facility closure impacts i.e., dismantling would be similar to construction impacts, and staff has found no significant socioeconomic impacts due to the construction of the project.

## **MITIGATION**

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Elk Hills contends that impacts to schools will be mitigated by the property taxes paid in connection with operation of the proposed project. Staff has determined that, even though a potential significant socioeconomic cumulative impact has been identified for Kern County schools during the construction period for five power plant projects in western Kern County, including the Elk Hills project, with the changes to the Education Code resulting from the passage of SB 50 in 1998, school funding is now restricted to a combination of property tax revenues and a statutory development fee based on a project's covered or enclosed space.

A potential significant socioeconomic cumulative impact on the KCFD has been identified. This impact results from the construction and operation of the Elk Hills and one-to-three other power plant projects in western Kern County (La Paloma, Sunrise, and Midway-Sunset West). The introduction of the new power plants in this area reduces the fire department's emergency rescue capabilities below acceptable levels. The owners of the Elk Hills project should reach an agreement with the KCFD for a share of the cost to bring the fire department's emergency rescue capabilities up to acceptable levels. The La Paloma, Sunrise, and Midway-Sunset West projects have or will also be required to pay a share of the fire department's costs for the new ladder truck, truck staffing and replacement truck. Should one or more of the projects not be certified as expected, Elk Hills' share of the cost for the new ladder truck, truck staffing and replacement truck will change.

## CONCLUSIONS AND RECOMMENDATIONS

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### CONCLUSIONS

The estimated gross benefits from the project include increases in the affected area's property and sales taxes, employment, and sales of services, manufactured goods and equipment. For example, during average construction there are 243 direct project-related construction jobs and 785 (243-average construction jobs x 3.23-the IMPLAN construction multiplier) total jobs (including power plant, transmission, water and gas lines) that will be created of which 542 are secondary (indirect and induced) jobs. For average operations, 20 direct jobs will be created with 38 secondary (indirect and induced) jobs for a total of 58 jobs. The annual property tax collected by Kern County for the Elk Hills power plant over the first ten years of operation, given an estimated minimum of 30 years of expected life, was estimated to be \$20 million by the Kern Economic Development Corporation (EHPP 1999a, AFC pages 5.8-18&19). However, Kern County granted Elk Hills a \$4.0 million tax incentive in May 1999 to reimburse the costs of building "public infrastructure" such as roads and street lighting (Bedell 1999).

Staff agrees with conclusions in the Elk Hills AFC that the project will not cause a significant adverse impact on the affected area's housing, schools, police, fire, emergency services, hospitals, utilities and employment, if mitigation for the fire department is provided, consistent with the proposed conditions of certification. Elk Hills will be partially reimbursed or credited for its up-front payment for the proposed agreement described in condition of certification SOCIO-2 by the County and/or the other power plant owners as appropriate.

Although staff identified a potentially significant socioeconomic cumulative impact on schools as a result of the Elk Hills and other new power plant projects in western Kern County, mitigation for the impact on schools is not possible under current state law.

The project, as proposed, is consistent with all applicable socioeconomic LORS. The proposed conditions of certification ensure compliance with LORS, and mitigation of the identified cumulative impact on the KCFD.

### RECOMMENDATIONS

For the area of socioeconomics, staff recommends that, with the adoption of the following conditions of certification, the Elk Hills project be approved.

### PROPOSED CONDITIONS OF CERTIFICATION

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**SOCIO-1** The project owner shall pay the statutory school impact development fee as required at the time of filing for the "in-lieu" building permit with the Kern County Department of Engineering and Survey Services and Building Inspection.

**Verification:** The project owner shall provide proof of payment of the statutory development fee to the Compliance Project Manager (CPM) in the next Monthly Compliance Report following the payment.

**SOCIO-2** In a timely manner after certification, the project owner shall reach agreement with the KCFD, La Paloma Generating Company, and Sunrise Cogeneration and Power Company (if the Sunrise project has been certified) on Elk Hills' share of the total funding for the following:

- 77. Purchase of a new 105-foot Pierce Quint Aerial ladder truck equipped for high angle and confined space rescues;
- 78. First year funding for nine new positions for personnel to cover three shifts for the new truck; and
- 79. First year funding for a replacement ladder truck.

**Verification:** Not later than 45 days after certification, the project owner shall provide the CPM with a copy of an agreement with the KCFD and the owners of the power plant projects identified in this condition for funding of items 1 through 3. above.

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# **GEOLOGY AND PALEONTOLOGY**

Testimony of Robert Anderson

## **INTRODUCTION**

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The geology section discusses the project's potential impacts regarding geological hazards, geological and paleontological resources, and surface water hydrology. The purpose of the geology analysis is to verify that the applicable laws, ordinances, regulations, and standards (LORS) have been identified and that the project can be designed and constructed in accordance with all applicable LORS, and in a manner that protects environmental quality and assures public health and safety. The objective of staff is to ensure that there will be no significant adverse impacts to significant geological and paleontological resources, and surface water hydrology during project construction, operation and closure. The section concludes with the staff's proposed monitoring and mitigation measures with respect to geological hazards, geological and paleontological resources, and surface water hydrology, with the inclusion of ten conditions of certification.

## **LAWS, ORDINANCES, REGULATIONS AND STANDARDS**

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The applicable LORS are listed in the Application for Certification (AFC), in Sections 5.4, 5.5 and 5.17 (EHPP 1999a). A brief description of the LORS for geological hazards and resources, paleontological resources, and drainage and erosion control follows:

### **FEDERAL**

There are no federal LORS for geological hazards and resources, or grading and erosion control. The United States Bureau of Land Management (BLM) requires an excavation permit for excavations and grading on land under their jurisdiction. The Elk Hills Power Project power plant is not located on lands under the jurisdiction of the BLM. An excavation permit from BLM will be required since water supply pipeline route from mile post 8.6 to mile post 9.1 crosses land under the jurisdiction of the BLM (EHPP 1999a, page 5.7-18). Federal Land Planning Management Act (FLPMA) and NEPA also apply.

### **STATE AND LOCAL**

The California Building Code (CBC) 1998 edition is based upon the Uniform Building Code (UBC), 1997 edition, which was published by the International Conference of Building Officials. The CBC is a series of standards that are used in the investigation, design (Chapters 16 and 18) and construction (including grading and erosion control as found in Appendix Chapter 33) that were based upon the UBC that includes supplemental standards specific to California. The CBC has been adopted by the Kern County Building and Services Department and supplements their grading and construction ordinances and regulations.

The California Environmental Quality Act (CEQA) Guidelines Appendix G provides a checklist of questions that a lead agency should normally address if relevant to a project's environmental impacts.

Section (V) (c) asks if the project will directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

Sections (VI) (a), (b), (c), (d), and (e) pose questions that are focused on whether or not the project would expose persons or structures to geological hazards.

Sections (X) (a) and (b) pose questions about the project's effect on mineral resources.

The Standard Procedures, Measures for Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources (Society of Vertebrate Paleontology) are a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources. They were adopted in October 1994 by a national organization of vertebrate paleontologists (the Society of Vertebrate Paleontologists).

Kern County Development Standards (dated August 1995) Division Four Section 401-1 (Standards for Drainage) and Division Eight, Sections 408-1 and 408-2 (Retention Basin Volume and Hydraulic Design) apply to the site.

## **SETTING**

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The site is located in the Elk Hills, in Western Kern County. Geology at the site is made up of silt, sand and gravel outcropping of the Tulare Formation, alluvium and minor amounts of fill. The soil overlying most of the power plant footprint area has been disturbed. The site slope gradient is very shallow, so the potential for slope stability problems is remote. Groundwater was encountered at a depth of over 1,000 feet below existing grade in the footprint of the proposed power plant. Groundwater along the linear facilities varies from 200 feet below existing grade to over 1,000 feet below existing grade.

## **ANALYSIS AND IMPACTS**

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### **FAULTING AND SEISMICITY**

No active faults are known to cross the proposed power plant footprint or the linear facilities. Several inactive faults cross electric transmission line route 1A and water supply pipeline Route 2. The project is located within seismic zone 4 as delineated on Figure 16-2 of the 1998 edition of the California Building Code. The active fault closest to the site is San Andreas fault which is located approximately 12 miles west of the site. The estimated peak horizontal ground acceleration for the site is 0.51g and is based upon a  $M_w$  8.0 earthquake occurring on the San Andreas Fault near the site. It should be noted that since the site is located upon a large anticlinal structure adjacent to the Coast Range Mountains, that earthquakes associated with



blind thrust faults or possibly the Elk Hills Anticline may also affect the site. The applicant has estimated that the peak horizontal ground acceleration associated with the blind thrust faults along the eastern side of the Coast Range Mountains is 0.29g (EHPP 1999a).

## **LIQUEFACTION, HYDROCOMPACTION, EXPANSIVE SOILS**

Liquefaction is a condition in which a cohesionless soil may lose shear strength due to a sudden increase in pore water pressure. Liquefaction usually is observed in the upper 100 feet beneath a site if it occurs at all. The depth to groundwater at the proposed power plant location is in excess of 1,000 feet. The depth along the proposed linear facilities is reported to be in excess of 200 feet. Since the depth to ground water at the proposed power plant and the linear facilities is greater than 100 feet, the potential for liquefaction at the site is considered to be nil.

Hydrocompaction is the process of the loss of soil volume upon the application of water. The soils at the project site are partially saturated and dense and are not considered to be prone to hydrocompaction. In addition subsidence due to oil extraction has not been reported by the applicant nor was any subsidence at the site observed by Energy Commission staff during their tour of the proposed site in March 1999.

Soils that contain a high percentage of expansive clay minerals are prone to expansion, if subjected to an increase in water content. Expansive soils are usually measured with an index test such as the expansive index potential. In order for a soil to be a candidate for testing, the soil must have a high clay content. Near surface soils reported in the AFC, (EHPP 1999a) are classified as a sandy loam. An expansive index test was conducted on several samples from boring within the footprint of the proposed powerplant. One sample from Boring B-1 had a high Elastic Index Value (94). The sample was taken between 3 to 5 feet below existing grade. No other sample tested had a high Elastic Index Value. The soils at this location should be further assessed during the final geotechnical investigation.

## **GEOLOGICAL AND PALEONTOLOGICAL RESOURCES**

The site is located on one of the largest oil and natural gas reserves in the United States. No other geological resources have been identified at the site or along the electric transmission line alignments, the natural gas supply line, or the water supply line. Directional drilling techniques and oil and gas extraction techniques allow the development of oil and gas at the site without interruption. The Department of Conservation, Division of Oil and Gas and Geothermal Resources requires that a setback from existing wells be maintained so that the wells may be serviced. Energy Commission staff have proposed a Condition of Certification (**GEO-3**) that should allow the project owner to work out a linear facility development plan that will ensure that construction of the power plant and linear facilities will not pose a hazard or a problem to existing oil wells.

The site is located on the alluvium. No paleontological resources are known to exist at the site. The Tulare is known to contain either vertebrate or invertebrate fossils or both. The alluvium in the vicinity of the site and linear facilities is not known to

contain fossils. However the alluvium is known to contain fossils near Taft and Buttonwillow. Energy Commission staff have proposed conditions of certification that will enable the applicant to mitigate impacts upon paleontological resources to a less than significant level should they be encountered during construction, operation, and closure of the project.

## **SURFACE WATER HYDROLOGY**

The project is not located in a 100-year flood zone. The minimum grade for the power plant area will be 1% and all drainage will be directed away from buildings within the footprint. Spill containment features are described by the applicant to have a minimum of one foot of freeboard. Run-off during a 100-year 24-hour storm event should not overwhelm the capacity of the proposed surface water drainage system.

## **FACILITY CLOSURE**

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There are three kinds of facility closure. A definition and general approach to closure is presented in the General Conditions section of this document. Facility closure activities are not anticipated to impact geological or paleontological resources. This is due to the fact that no paleontological or geological resources are known to exist at the power plant location. In addition, decommissioning and closure of the power plant should not negatively affect geological or paleontological resources since the majority of the ground disturbed in plant decommissioning and closure would have been disturbed in the construction of the plant. Surface water hydrology impacts will depend upon the closure activities proposed.

## **ANALYSIS AND POTENTIAL IMPACTS**

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### **SITE SPECIFIC IMPACTS**

The project is not likely to have any impact on geological or paleontological resources. There will be a minor, insignificant increase in the surface water drainage off-site. The applicant will need to further assess the extent of the expansive soil encountered in Boring B-1 since it is located in the footprint of the powerplant.

### **CUMULATIVE IMPACTS**

It is staff's opinion that the potential for a significant adverse cumulative impact on paleontological resources, geological resources, or surface water hydrology is unlikely, if the Elk Hills Power Project is constructed according to the proposed conditions of certification. This opinion is based on the fact that the site is not known to have significant paleontological or geological resources.

## **MITIGATION**

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Based upon the literature and archives search, field surveys and the preliminary geotechnical investigation for the project, the applicant has proposed monitoring

and mitigation measures to be followed during the construction of the power plant, related natural gas supply line, electrical transmission line, and the waste water pipelines. Energy Commission staff agree with the applicant that there is a low probability that vertebrate fossils will be encountered during construction of the power plant and related features.

The proposed conditions of certification are to allow the Energy Commission Compliance Project Manager (CPM) and the applicant to adopt a compliance monitoring scheme that will ensure LORS applicable to geological hazards, geological and paleontological resources, and surface water hydrology for the project are complied with.

## **CONCLUSION AND RECOMMENDATIONS**

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The applicant will likely be able to comply with applicable LORS. The project should have no adverse impact with respect to geological and paleontological resources and surface water hydrology. Staff propose to ensure compliance with applicable LORS for geological hazards, geological and paleontological resources and surface water hydrology with the adoption of the proposed conditions of certification listed below.

## **PROPOSED CONDITIONS OF CERTIFICATION**

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**GEO-1** Prior to the start of construction, the project owner shall assign to the project an engineering geologist(s), certified by the State of California, to carry out the duties required by the 1998 edition of the California Building Code (CBC) Appendix Chapter 33, Section 3309.4. The certified engineering geologist(s) assigned must be approved by the CPM (the functions of the engineering geologist can be performed by the responsible geotechnical engineer, if that person has the appropriate California license).

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of construction, the project owner shall submit to the CPM for approval the name(s) and license number(s) of the certified engineering geologist(s) assigned to the project. The submittal should include a statement that CPM approval is needed. The CPM will approve or disapprove of the engineering geologist(s) and will notify the project owner of its findings within 15 days of receipt of the submittal. If the engineering geologist(s) is subsequently replaced, the project owner shall submit for approval the name(s) and license number(s) of the newly assigned individual(s) to the CPM. The CPM will approve or disapprove of the engineering geologist(s) and will notify the project owner of the findings within 15 days of receipt of the notice of personnel change.

**GEO-2** The assigned engineering geologist(s) shall carry out the duties required by the 1998 CBC, Appendix Chapter 33, Section 3309.4 Engineered Grading Requirement, and Section 3318.1 – Final Reports. Those duties are:

80. Prepare the Engineering Geology Report. This report shall accompany the Plans and Specifications when applying to the CBO for the grading permit.
81. Monitor geologic conditions during construction.
82. Prepare the Final Engineering Geology Report.

The Engineering Geology Report required by the 1998 CBC Appendix Chapter 33, Section 3309.3 Grading Designation, shall include an adequate description of the geology of the site, conclusions and recommendations regarding the effect of geologic conditions on the proposed development, and an opinion on the adequacy, for the intended use, of the site as affected by geologic factors.

The Final Engineering Geology Report to be completed after completion of grading, as required by the 1998 CBC Appendix Chapter 33, Section 3318.1, shall contain the following: A final description of the geology of the site and any new information disclosed during grading; and the effect of same on recommendations incorporated in the approved grading plan. The engineering geologist shall submit a statement that, to the best of his or her knowledge, the work within their area of responsibility is in accordance with the approved Engineering Geology Report and applicable provisions of this chapter.

**Verification:** (1) Within 15 days after submittal of the application(s) for grading permit(s) to the CBO, the project owner shall submit a signed statement to the CPM stating that the Engineering Geology Report has been submitted to the CBO as a supplement to the plans and specifications and that the recommendations contained in the report are incorporated into the plans and specifications. (2) Within 90 days following completion of the final grading, the project owner shall submit copies of the Final Engineering Geology Report required by the 1998 CBC Appendix Chapter 33, Section 3318 Completion of Work, to the CPM and the CBO.

**GEO-3** The project owner shall submit a linear facility (transmission lines and utility lines) development plan, addressing any actions to be undertaken by the project owner to ensure no hazard or problems will be created with the existing wells in the construction site and laydown areas, to the Department of Conservation, Division of Oil and Gas and Geothermal Resources (DOGGR) for review and comment. The linear facility development plan shall include a discussion of how a minimum setback from existing oil wells is to be maintained.

**Verification:** At least sixty days prior to the start of construction, the project owner shall submit to the CPM a copy of DOGGR's letter commenting on the linear facility development plan. Within fifteen (15) days of the receipt of the linear facility development plan and the DOGGR comment letter on the plan, the CPM will either approve or comment and deny the plan, and transmit the approval or denial letter to the project owner.

**PAL-1** Prior to the start of any project-related construction activities (defined as any construction-related vegetation clearance, ground disturbance and preparation, and site excavation activities), the project owner shall ensure that the designated paleontological resource specialist approved by the CPM is available for field activities and prepared to implement the conditions of certification.

The designated paleontological resources specialist shall be responsible for implementing all the paleontological conditions of certification and for using qualified personnel to assist in this work.

Protocol: The project owner shall provide the CPM with the name and statement of qualifications for the designated paleontological resource specialist.

The statement of qualifications for the designated paleontological resources specialist shall demonstrate that the specialist meets the following minimum qualifications: a degree in paleontology or geology or paleontological resource management; and at least three years of paleontological resource mitigation and field experience in California, including at least one year's experience leading paleontological resource mitigation and field activities.

The statement of qualifications shall include a list of specific projects the specialist has previously worked on; the role and responsibilities of the specialist for each project listed; and the names and phone numbers of contacts familiar with the specialist's work on these referenced projects.

If the CPM determines that the qualifications of the proposed paleontological resource specialist are not in concert with the above requirements, the project owner shall submit another individual's name and qualifications for consideration.

If the approved, designated paleontological resource specialist is replaced prior to completion of project mitigation, the project owner shall obtain CPM approval of the new designated paleontological resource specialist by submitting the name and qualifications of the proposed replacement to the CPM, at least ten (10) days prior to the termination or release of the preceding designated paleontological resource specialist.

Should emergency replacement of the designated specialist become necessary, the project owner shall immediately notify the CPM to discuss the qualifications of its proposed replacement specialist.

Verification: At least ninety (90) days prior to the start of construction, the project owner shall submit the name and resume and the availability for its designated paleontological resource specialist, to the CPM for review and approval. The CPM shall provide written approval or disapproval of the proposed paleontological resource specialist.

At least ten (10) days prior to the termination or release of a designated paleontological resource specialist, the project owner shall obtain CPM approval of the replacement specialist by submitting to the CPM the name and resume of the proposed new designated paleontological resource specialist. Should emergency replacement of the designated specialist become necessary, the project owner shall immediately notify the CPM to discuss the qualifications of its proposed replacement specialist.

**PAL-2** Prior to the start of project construction, the designated paleontological resource specialist shall prepare a Paleontological Resources Monitoring and Mitigation Plan to identify general and specific measures to minimize potential impacts to sensitive paleontological resources, and submit this plan to the CPM for review and approval. After CPM approval, the project owner's designated paleontological resource specialist shall be available to implement the Monitoring and Mitigation Plan, as needed, throughout project construction.

In addition to the project owner's adoption of the guidelines of the Society of Vertebrate Paleontologists, as modified in the Application for Certification for the DEC, dated December 1998, the Paleontological Resources Monitoring and Mitigation Plan shall include, but not be limited to, the following elements and measures:

- A discussion of the sequence of project-related tasks, such as any pre-construction surveys, fieldwork, flagging or staking; construction monitoring; mapping and data recovery; fossil preparation and recovery; identification and inventory; preparation of final reports; and transmittal of materials for curation;
- Identification of the person(s) expected to assist with each of the tasks identified within this condition for certification, and a discussion of the mitigation team leadership and organizational structure, and the inter-relationship of tasks and responsibilities;
- Where monitoring of project construction activities is deemed necessary, the extent of the areas where monitoring is to occur and a schedule for the monitoring;
- An explanation that the designated paleontological resource specialist shall have the authority to halt or redirect construction in the immediate vicinity of a vertebrate fossil find until the significance of the find can be determined;
- A discussion of equipment and supplies necessary for recovery of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;
- Inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meets the Society of Vertebrate Paleontologists standards and requirements for the curation of paleontological resources; and

- Identification of the institution that has agreed to receive any data and fossil materials recovered during project-related monitoring and mitigation work, discussion of any requirements or specifications for materials delivered for curation and how they will be met, and the name and phone number of the contact person at the institution.

**Verification:** At least sixty (60) days prior to the start of construction on the project, the project owner shall provide the CPM with a copy of the Monitoring and Mitigation Plan prepared by the designated paleontological resource specialist for review and approval. If the plan is not approved, the project owner, the designated paleontological resource specialist, and the CPM shall meet to discuss comments and negotiate necessary changes.

**PAL-3** Prior to the start of construction, and throughout the project construction period as needed for all new employees, the project owner and the designated paleontological resource specialist shall prepare and conduct CPM-approved training to all project managers, construction supervisors, and workers who operate ground disturbing equipment. The project owner and construction manager shall provide the workers with the CPM-approved set of procedures for reporting any sensitive paleontological resources or deposits that may be discovered during project-related ground disturbance.

**Protocol:** The paleontological training program shall discuss the potential to encounter paleontological resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources.

The training shall also include the set of reporting procedures that workers are to follow if paleontological resources are encountered during project activities. The training program shall be presented by the designated paleontological resource specialist and may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or any other areas of interest or concern.

**Verification:** At least (30) thirty days prior to the start of project construction, the project owner shall submit to the CPM for review, comment, and written approval, the proposed employee training program and the set of reporting procedures the workers are to follow if paleontological resources are encountered during project construction.

If the employee training program and set of procedures are not approved, the project owner, the designated paleontological resource specialist, and the CPM shall meet to discuss comments and negotiate necessary changes, before the beginning of construction.

Documentation for training of additional new employees shall be provided in subsequent Monthly Compliance Reports, as appropriate.

**PAL-4** The designated paleontological resource specialist shall be present at all times he or she deems appropriate to monitor construction-related grading, excavation, trenching, and/or augering in areas where potentially fossil-bearing sediments have been identified. If the designated paleontological resource specialist determines that full-time monitoring is not necessary in certain portions of the project area or along portions of the linear facility routes, the designated specialist shall notify the project owner.

**Verification:** The project owner shall include in the Monthly Compliance Reports a summary of paleontological activities conducted by the designated paleontological resource specialist.

**PAL-5** The project owner, through the designated paleontological resource specialist, shall ensure recovery, preparation for analysis, analysis, identification and inventory, the preparation for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during the monitoring, data recovery, mapping, and mitigation activities related to the project.

**Verification:** The project owner shall maintain in its compliance files copies of signed contracts or agreements with the designated paleontological resource specialist and other qualified research specialists who will ensure the necessary data and fossil recovery, mapping, preparation for analysis, analysis, identification and inventory, and preparation for and delivery of all significant paleontological resource materials collected during data recovery and mitigation for the project. The project owner shall maintain these files for a period of three years after completion and approval of the CPM-approved Paleontological Resources Report and shall keep these files available for periodic audit by the CPM.

**PAL-6** The project owner shall ensure preparation of a Paleontological Resources Report by the designated paleontological resource specialist. The Paleontological Resources Report shall be completed following completion of the analysis of the recovered fossil materials and related information. The project owner shall submit the paleontological report to the CPM for approval.

**Protocol:** The report shall include (but not be limited to) a description and inventory list of recovered fossil materials; a map showing the location of paleontological resources encountered; determinations of sensitivity and significance; and a statement by the paleontological resource specialist that project impacts to paleontological resources have been mitigated.

**Verification:** The project owner shall submit a copy of the Paleontological Resources Report to the CPM for review and approval under a cover letter stating that it is a confidential document. The report is to be prepared by the designated



paleontological resource specialist within 90 days following completion of the analysis of the recovered fossil materials.

**PAL-7** The project owner shall include in the facility closure plan a description regarding facility closure activity's potential to impact paleontological resources. The conditions for closure will be determined when a facility closure plan is submitted to the CPM twelve months prior to closure of the facility. If no activities are proposed that would potentially impact paleontological resources, then no mitigation measures for paleontological resource management are required in the facility closure plan.

Protocol: The closure requirements for paleontological resources are to be based upon the Paleontological Resources Report and the proposed grading activities for facility closure.

Verification: The project owner shall include a description of closure activities described above in the facility closure plan.

## REFERENCES

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- EHPP (Elk Hills Power Project). 1999a. Application for Certification, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, February 24, 1999.
- EHPP (Elk Hills Power Project). 1999b. Application for Certification, Addendum I, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, March 14, 1999.
- EHPP (Elk Hills Power Project). 1999c. Application for Certification, Elk Hills Power Project (99-AFC-1), confidential filing for Paleontological Resources. Submitted to the California Energy Commission, February 24, 1999.
- SVP (Society of Vertebrate Paleontologists). 1994. Measures for Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources: Standard Procedures. October 1
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# **FACILITY DESIGN**

Testimony of Steve Baker, Kisabuli and Al McCuen

## **INTRODUCTION**

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Facility Design encompasses the civil, structural, mechanical and electrical engineering aspects of the project. The purpose of the Facility Design analysis is to verify that laws, ordinances, regulations and standards (LORS) applicable to the design and construction of the project have been identified; and that the project and ancillary facilities have been described in sufficient detail, including design criteria and analysis methods, to provide reasonable assurance that the project can be designed and constructed in accordance with all applicable LORS, and in a manner that protects environmental quality and assures public health and safety.

This analysis also examines whether special design features should be considered during final design to deal with conditions unique to the site which could influence public health and safety, environmental protection or the operational reliability of the project. This analysis further identifies the design review and construction inspection process and establishes conditions of certification that will be used to ensure compliance with the intent of the LORS and any special design requirements.

## **FINDINGS REQUIRED**

The Warren Alquist Act requires the commission to "prepare a written Decision ....which includes...(a) Specific provisions relating to the manner in which the proposed facility is to be designed, sited, and operated in order to protect environmental quality and assure public health and safety [and] (d)(1) Findings regarding the conformity of the proposed site and related facilities...with public safety standards...and with other relevant local, regional, state and federal standards, ordinances, or laws..."(Pub. Resources Code, §25523).

## **SUBJECTS DISCUSSED**

Subjects covered in this analysis include:

83. Identification of the LORS applicable to facility design;
84. Evaluation of the applicant's proposed design criteria, including the identification of those that are essential to ensuring protection of the environment and public health and safety;
85. Proposed modifications and additions to the AFC that are necessary to comply with applicable LORS;
86. Identification of the Energy Commission's design review and construction inspection process, which is used to ensure compliance with applicable LORS and protection of the environment and public health and safety; and
87. Conditions of certification proposed by staff to ensure that the project will be designed and constructed to comply with all applicable LORS, and protect environmental quality and assure public health and safety.

## SETTING

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Elk Hills Power, LLC (EHP) proposes to construct and operate the Elk Hills Power Project (EHPP), a 500-megawatt (MW) powerplant in western Kern County, California. EHPP will be located on a 12-acre site in Section 35, Township 30 South, Range 23 East, MDB&M, Kern County, California. EHPP is located in seismic zone 4, the highest seismic shaking zone in the country. Additional engineering details of the proposed project are contained in the Application for Certification (AFC), in Appendices A through H (EHPP 1999a).

## LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

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The applicable LORS for each engineering discipline, civil, structural, mechanical and electrical, are included as part of the engineering appendices, Appendices A through H, and summarized in Section 6.0, Engineering (EHPP 1999a). A summary of these LORS includes: Title 24, California Code of Regulations, which adopts the current edition of the California Building Code (CBC) as minimum legal building standards; the 1998 CBC for design of structures; American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code; and National Electrical Manufacturers Association (NEMA) standards.

## ANALYSIS

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The basis of this analysis is the applicant's proposed analysis methods, construction methods and list of LORS and design criteria set forth in the AFC. Applicable engineering sections include:

- Section 1.2 Project Ownership
- Section 1.5 Project Schedule
- Section 3 Facility Description and Location
- Section 3.6 Transmission Line Description
- Section 3.7 Pipelines
- Section 3.8 Project Construction
- Section 6 Laws, Ordinances, Regulations and Standards (LORS)

### Appendices

- 1. Appendix A Foundation and Civil Engineering Design Criteria
- 2. Appendix B Structural and Seismic Engineering Design Criteria
- 3. Appendix C Mechanical Engineering Design Criteria
- 4. Appendix D Control Systems Engineering Design Criteria
- 5. Appendix E Electrical Engineering Design Criteria
- 6. Appendix F Major Equipment List
- 7. Appendix G Geotechnical Engineering Investigations

## SITE PREPARATION AND DEVELOPMENT

Staff has evaluated the proposed design criteria for grading, flood protection, erosion control, site drainage, and site access. Staff has assessed the criteria for designing and constructing linear support facilities such as a natural gas pipeline

and electric transmission line. The applicant proposes to use accepted industry standards (see AFC Appendix A for a list of the applicable industry standards), design practices, and construction methods in preparing and developing the site. The applicant's proposed methods follow industry standard practices. Staff concludes that the project, including its linear facilities, is likely to comply with the applicable site preparation LORS, and proposes conditions of certification included below to ensure compliance.

## **MAJOR STRUCTURES, SYSTEMS AND EQUIPMENT**

Major structures, systems and equipment are defined as those structures and associated components or equipment that are necessary for power production and are costly to repair or replace, or that require a long lead time to repair or replace, or those used for the storage, containment, or handling of hazardous or toxic materials. Major structures and equipment are listed in the conditions of certification (**GEN-2** below).

The AFC contains a list of the civil, structural, mechanical and electrical design criteria that demonstrate the likelihood of compliance with applicable LORS, and which staff believes are essential to ensuring that the project is designed in a manner that protects the environment and public health and safety.

## ***PROPOSED MODIFICATIONS***

The AFC (EHPP 1998a, Appendices A and B) identifies applicable LORS, which include the 1997 UBC. The project should be designed and constructed to the 1998 edition of the CBC, and other applicable codes and standards in effect at the time design and construction of the project actually commence. In the event the design of EHPP is submitted to the Chief Building Official (CBO)<sup>1</sup> for review when the successor to the 1998 CBC is in effect, the 1998 CBC provisions, identified herein, shall be replaced with the applicable successor provisions.

## ***CBC LATERAL FORCE REQUIREMENTS***

The procedures and limitations for the seismic design of structures by the 1998 CBC are determined considering seismic zoning, site characteristics, occupancy, structural configuration, structural system and height. Different design and analysis procedures are recognized in the 1998 CBC for determining seismic effects on structures. The dynamic lateral force procedure of Section 1631 is always acceptable for design. The static lateral force procedure of Section 1630 is allowed under certain conditions of regularity, irregularity, occupancy and height determined under Section 1629. Nonbuilding structures are included in Section 1634. Most of the structures in power plant projects are considered nonbuilding structures.

## ***STATIC LATERAL FORCE PROCEDURE***

In seismic Zones 3 and 4, the static lateral force procedure of Section 1630 may be used for the following:

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<sup>1</sup> The CBO is the Energy Commission's duly appointed representative, which may be the City or County Chief Building Official, or other appointed representative.

88. Regular structures under 240 feet in height with lateral force resistance provided by systems, listed in Table 16-N, except where Section 1629.8.4, Item 4, applies. (Structures, regular or irregular, located on Soil Profile Type SF, which has a period greater than 0.7 second require dynamic analysis.)
89. Irregular structures not more than five stories or 65 feet in height.

### ***DYNAMIC LATERAL FORCE PROCEDURE***

In seismic zones 3 and 4, the dynamic lateral force procedure of Section 1631 shall be used for all other structures, including the following:

90. Structures having a stiffness, weight or geometric vertical irregularity of Type 1, 2 or 3, as defined in Table 16-L, or structures having irregular features not described in Table 16-L or 16-M, except as permitted by Section 1630.4.2. (Where a combination of structural systems is included in the same structure, the structure can be analyzed as two independent structures for purposes of determining regularity.)
91. Structures over five stories or 65 feet, not having the same structural system throughout their height except as permitted by Section 1631.2. (An elastic design response spectrum constructed in accordance with Figure 16-3 of the 1998 CBC, using the values of  $C_a$  and  $C_v$  consistent with the specific site can be used.)
92. Structures, regular or irregular, located on Soil Profile Type SF, that have a period greater than 0.7 seconds.

### ***RIGID STRUCTURES LATERAL FORCE DESIGN***

Rigid structures (those with a fundamental period less than 0.06 second) and their anchorages shall be designed using procedures consistent with the requirements of Section 1634.3 and any other applicable provisions of Section 1634.

### ***TANKS WITH SUPPORTED BOTTOMS***

Flat bottom tanks or other tanks with supported bottoms founded at or below grade shall be designed consistent with Section 1634.4 and any other applicable provisions of Section 1634.

### ***OTHER NONBUILDING STRUCTURES***

Nonbuilding structures not covered by Sections 1634.3 and 1634.4 shall be designed consistent with the requirements of Section 1634.5 and any other applicable provisions of Section 1634.

### ***ENSURING THE APPROPRIATE LATERAL FORCE PROCEDURE***

In order to ensure that structures are analyzed using the appropriate lateral force procedure, staff has included Proposed Condition of Certification **STRUC-1** below, which in part requires review and approval by the CBO of the project owner's proposed lateral force procedures prior to the start of construction.

## **CIVIL/STRUCTURAL FEATURES**

The EHPP will consist of two combustion turbine generators (CTGs), two heat recovery steam generators (HRSGs), one steam turbine generator (STG) and one condenser. The balance of plant (BOP) will include a single 1.0 million-gallon feedwater storage tank, a wet cooling tower, a 12,000 gallon anhydrous ammonia storage tank, control and administrative buildings, and feedwater pumps. The applicant proposes that these major components will be supported on reinforced concrete mat foundations at grade. Each HRSG will be provided with a self-supporting steel stack. The stacks will extend 120 feet above grade. The powerplant and related facilities will be designed to meet the seismic requirements of the California Building Code.

The CTGs, HRSGs, STG and condenser will be located outdoors and will be supported at grade on reinforced concrete mat foundations. The three step-up transformers and two auxiliary transformers will also be supported at grade on reinforced concrete mat foundations. BOP mechanical and electrical equipment will be supported at grade on individual reinforced concrete pads.

## **MECHANICAL SYSTEMS**

Mechanical features of the project include two CTGs and HRSGs. Each CTG system will be capable of producing approximately 153 MW of electricity at site conditions. Power will be generated by the CTGs at 18 kV and stepped up by two transformers to 230 kV.

Exhaust gas from each CTG will flow directly through a HRSG with duct burner and selective catalytic reduction (SCR), before passing through the exhaust stack.

The CTGs will be equipped with dry low NO<sub>x</sub> combustors used to control NO<sub>x</sub>. The HRSG will be equipped with an SCR system, utilizing anhydrous ammonia, and associated support equipment. The CTGs will also be equipped with evaporative inlet air cooling and steam injection for power augmentation.

Other features of the project include: water and wastewater treatment equipment; pressure vessels, piping systems and pumps; anhydrous ammonia storage, handling and piping system; air compressors; fire protection systems; and heating, ventilation, air conditioning (HVAC), potable water, plumbing and sanitary sewage systems.

## ***MECHANICAL LORS AND DESIGN CRITERIA***

The application (EHPP 1999a, Appendix C) lists and describes the mechanical codes, standards and design criteria that will be employed in project design documents, procurement specifications and contracts. Design work will be performed in accordance with the appropriate LORS. This list indicates that the applicant is aware of the codes, standards, and design criteria appropriate for such a project. This approach will likely assure the project's mechanical systems are designed to the appropriate codes and standards. Staff has proposed conditions of

certification (**MECH-1** through **MECH-4**, below) to monitor compliance with this requirement.

## ELECTRICAL SYSTEMS

Major electrical features of the project other than transmission include generators, power control wiring, protective relaying, grounding system, cathodic protection system and site lighting (EHPC 1998a, Appendix E).

93. Power and Control Wiring. In general, conductors will be insulated on the basis of a normal maximum conductor temperature of 90°C in 40°C ambient air with a maximum emergency overload temperature of 130°C and a short circuit temperature of 250°C. In areas with higher ambient temperatures, larger conductors will be used or higher temperature rated insulation will be selected.
94. Protective Relaying. These relays protect equipment in the auxiliary power supply system, generator terminal systems, 230 kV system, 4.16 kV systems, turbine-generator system, and the electrical loads powered from these systems. The protective relaying scheme will be designed to remove or alarm any of the abnormal occurrences.
95. Classification of Hazardous Areas. Areas where flammable and combustible liquids, gases, and dusts are handled and stored will be classified for determining the minimum criteria for design and installation of electrical equipment to minimize the possibility of ignition. The criteria for determining the appropriate classification are specified in Article 500 of the National Electrical Code (NFPA/ANSI C1).
96. Grounding. The station grounding system will be an interconnected network of bare copper conductors and copper clad ground rods. The system will be provided to protect plant personnel and equipment from hazard, which can occur during power system faults and lightning strikes. The station-grounding grid will be designed for adequate capacity to dissipate heat from ground current under the most severe conditions in areas of high ground fault current concentrations.
97. Site Lighting. The site lighting system will provide personnel with illumination for the performance of general yard tasks, safety, and plant security. Power used to supply outdoor roadway and area lighting will be 277 volts.
98. Freeze Protection. A freeze protection system will be provided for selected outdoor piping as required. Parallel circuit type heating cable will be utilized where possible.
99. Cathodic Protection System. Cathodic protection and other corrosion control measures for all plant structures, including the exterior surface of underground piping and bottoms of surface mounted steel tanks will be provided as required.

The AFC (EHPP 1999a, Appendix E) lists and describes the electrical codes, standards and design criteria that will be employed in project design documents,



procurement specifications and contracts. Design work will be performed in accordance with the appropriate LORS. This list indicates that the applicant is aware of the codes, standards, and design criteria appropriate for such a project. This approach will likely assure the project's electrical systems are designed to the appropriate codes and standards.

Staff concludes that the applicant can design the electrical systems in accordance with all LORS and in a manner which protects the environment and public health and safety by complying with the applicable LORS and electrical design criteria (EHPP 1999a, Appendix E). Staff has proposed conditions of certification (**ELEC-1** and **ELEC-2**, below) to monitor this compliance.

## **ANCILLARY FACILITIES**

### ***NATURAL GAS SUPPLY LINE***

The project will be fueled with locally produced natural gas from the Elk Hills Oil and Gas Field. Natural gas will be conveyed to the powerplant site via a 2,500 foot, 10-inch supply pipeline extending from a 20-inch gas pipeline supplied from the existing, nearby gas processing facilities operated by Occidental of Elk Hills, Inc. (OEHI).

### ***EMISSION CONTROLS***

NO<sub>x</sub> emissions from the combustion process will be reduced to 2.5 parts per million by volume dry (ppmvd), or less, at 15 percent oxygen, by utilizing dry low NO<sub>x</sub> combustion technology and a SCR system. The SCR system will use anhydrous ammonia for the reduction process.

### ***WATER SUPPLY PIPELINE***

West Kern Water District (WKWD) will supply water for the proposed project. The water will be conveyed via a 9.8 mile, 16-inch water supply pipeline extending from the existing WKWD facilities located east of the powerplant site and adjacent to State Highway 119.

### ***WASTEWATER PIPELINE***

Wastewater collected in the plant wastewater collection tank is disposed of by injection into new disposal wells. The new disposal wells will be located near existing disposal wells used to dispose of produced water from OEHI's operation. The wastewater discharge of the plant will be conveyed by a new 4.4 mile, 6-inch pipeline to the new wells, located south of the powerplant site.

## **PROJECT QUALITY PROCEDURES**

The AFC describes a Project Quality Program that will be used on the project to maximize confidence that systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with the technical codes and standards appropriate for a powerplant. Compliance with design requirements will be verified through an appropriate program of inspections and audits. Employment

of this Quality Assurance/Quality Control (QA/QC) program will likely ensure that the project is designed, procured, fabricated and installed in accordance with LORS.

## **COMPLIANCE MONITORING**

### ***THE ENERGY COMMISSION'S DESIGN REVIEW AND CONSTRUCTION INSPECTION PROCESS***

Under Section 104.2 of the CBC, the building official is authorized and directed to enforce all the provisions of the CBC. For all energy facilities certified by the Energy Commission, the Energy Commission is the building official and has the responsibility to enforce the code. In addition, the Energy Commission has the power to render interpretations of the CBC and to adopt and enforce rules and supplemental regulations to clarify the application of the CBC's provisions.

The Energy Commission's design review and construction inspection process is developed to conform to CBC requirements and ensure that all facility design conditions of certification are met. As provided by Section 104.2.2 of the CBC, the Energy Commission appoints experts to carry out the design review and construction inspections and act as delegate CBO on behalf of the Energy Commission. These delegate agents typically include the local building official and independent consultants hired to cover technical expertise not provided by the local official. The costs of the reviews and inspections are paid by the applicant through permit fees as provided by CBC Sections 107.2 and 107.3. While building permits in addition to the Energy Commission certification are not required for this project, in lieu permit fees are paid by the applicant consistent with CBC Section 107, to cover the costs of reviews and inspections.

Engineering and compliance staff has completed the following to ensure the design review and construction inspection process is consistent with the applicant's timing of the project:

100. Staff has met with the local building department to discuss the Energy Commission compliance process and the potential involvement of the local building official as delegate agent.
101. Staff has signed a Memorandum of Understanding (MOU) with Kern County outlining the roles and responsibilities of the County and its subcontractors as delegate agents appointed by the Energy Commission to ensure compliance with the CBC and facility design conditions of certification.
102. Staff has met with the County and its subcontractor to discuss the details of the design review and construction inspection process, fees, types of submittals required of the process and timing of the review.

Staff has developed conditions of certification (see the section below, titled "Proposed Conditions of Certification") to ensure compliance with LORS and protection of the environment and public health and safety. Some of these facility design conditions address the roles, responsibilities and qualifications of EHP's engineers responsible for the design and construction of the project (proposed

conditions of certification **GEN-1** through **GEN-8**). Engineers responsible for the design of the civil, structural, mechanical, and electrical portions of the project are required to be registered in California, and to sign and stamp each submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that no element of construction proceed without approval from the CBO. They also require that qualified special inspectors be assigned to perform or oversee special inspections required by the applicable LORS.

While the Energy Commission and delegate CBO have the authority to allow some flexibility with construction activities, these conditions are written to require that no element of construction of permanent facilities, which is difficult to reverse, may proceed without approval of plans from the CBO. For those elements of construction that are not difficult to reverse and are allowed to proceed without approval of the plans, EHP shall have the responsibility to fully modify those elements of construction to comply with all design changes that result from the CBO's plan review and approval process.

## **FACILITY CLOSURE**

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A facility closure was evaluated under three scenarios; Planned Closure, Unexpected Temporary Closure and Unexpected Permanent Closure.

### **PLANNED CLOSURE**

The removal of a facility from service, or decommissioning, as a result of the project reaching the end of its useful life, may range from "mothballing" to removal of all equipment and appurtenant facilities. Future conditions that may affect the decommissioning decision are largely unknown at this time.

In order to assure that decommissioning of the facility will be completed in a manner that is environmentally sound, safe, and will protect public health and safety, the applicant shall submit a decommissioning plan to the Energy Commission and Kern County for review and approval prior to the commencement of decommissioning. The plan shall include a discussion of the following items:

103. Proposed decommissioning activities for the project and all appurtenant facilities constructed as part of the project;
104. All applicable LORS, local/regional plans, and a discussion of the conformance of the proposed decommissioning activities to the applicable LORS and local/regional plans;
105. The activities necessary to restore the site if the plan requires removal of all equipment and appurtenant facilities; and
106. Decommissioning alternatives, other than complete site restoration.

### **UNEXPECTED TEMPORARY CLOSURE**

Under this scenario, it is expected that the facility is closed unexpectedly, on a short-term basis. Natural disasters, such as an earthquake or severe storm, can

cause an unexpected temporary closure of the facility. If damage to the facilities is too great, the temporary closure may become permanent.

If the facility is closed on a temporary basis, the applicant shall secure the site in order to protect public health and safety. If temporary closure becomes permanent, the applicant shall follow the "Planned Closure" procedures outlined in the Planned Closure.

## UNEXPECTED PERMANENT CLOSURE

Under this scenario, the project owner closes the facility unexpectedly on a permanent basis. In this case, the project owner shall implement the closure procedures outlined above for "Planned Closure".

The above requirements should serve as adequate protection, even in the unlikely event of project abandonment. To ensure that these measures are included in the Facility Closure Plan, staff has proposed a Condition of Certification (GEN-9) to ensure that these measures are included in the Facility Closure Plan.

## CONCLUSIONS AND RECOMMENDATIONS

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### CONCLUSIONS

107. The laws, ordinances, regulations, and standards (LORS), identified in the AFC and supporting documents, are those applicable to the project.
108. Staff has evaluated the AFC, and the project LORS and design criteria in the record. Staff concludes that the design, construction and eventual closure of the project are likely to comply with applicable LORS. If properly implemented, design criteria, including staff proposed modifications, will ensure that LORS are met during the project design and construction phases.
109. The conditions of certification proposed will ensure that the proposed facilities are designed, constructed, operated, and eventually closed in accordance with applicable LORS. This will occur through the use of design review, plan checking and field inspections, which are to be performed by the local CBO or other commission delegate agent. Staff will audit the CBO or delegate agent to ensure satisfactory performance.
110. The Energy Commission design review and construction inspection process will be in place for the project and will allow construction to start as scheduled if the project is certified. The process will provide the necessary reviews to ensure compliance with applicable facility design LORS and conditions of certification.
111. Whereas future conditions that may affect decommissioning are largely unknown at this time, it can reasonably be concluded that if the project owner submits a decommissioning plan required by **GEN-9**, prior to the commencement of decommissioning, that the decommissioning procedure is likely to result in satisfactory decommissioning performance.

## RECOMMENDATIONS

If the Energy Commission certifies the project, staff recommends that:

112. The Conditions of Certification proposed herein be adopted to ensure that the project is designed and constructed to comply with applicable LORS, and also to protect environmental quality, and assure public health and safety;
113. The project be designed and built to the 1998 CBC (or successor standard, if such is in effect); and
114. The CBO review the final designs, conduct plan checking and perform field inspections during construction, and staff audit and monitor the CBO to ensure satisfactory performance.

## CONDITIONS OF CERTIFICATION

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**GEN-1** The project owner shall design, construct and inspect the project in accordance with the 1998 California Building Code (CBC)<sup>2</sup> and all other applicable LORS in effect at the time initial design plans are submitted to the CBO for review and approval. The CBC in effect is that edition that has been adopted by the California Building Standards Commission and published at least 180 days previously.

In the event that the EHPP is submitted to the CBO when a successor to the 1998 CBC is in effect, the 1998 CBC provisions identified herein shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction, or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

**Verification:** Within 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) after receipt of the Certificate of Occupancy, the project owner shall submit to the California Energy Commission Compliance Project Manager (CPM) a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation and inspection requirements of the applicable LORS and the Energy Commission's Decision have been met for facility design. The project owner shall provide the CPM a copy of the Certificate of Occupancy within 30 days of receipt from the CBO [1998 CBC, Section 109 – Certificate of Occupancy.]

**GEN-2** The project owner shall furnish to the CPM and to the CBO a schedule of facility design submittals, a Master Drawing List, and a Master Specifications List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and

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<sup>2</sup> The Sections, Chapters, Appendices and Tables, unless otherwise stated, refer to the Sections, Chapters, Appendices and Tables of the 1998 California Building Code (CBC).

equipment (see a list of major structures and equipment in **Table 1: Major Equipment List** and **Table 2: Major Structures, Equipment and Associated Foundations** below). To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

**Verification:** At least 60 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of rough grading, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The project owner shall provide schedule updates in the Monthly Compliance Report.

**Table 1: Major Equipment List**

Quantity	Description	Size/Capacity*	Remarks
2	Combustion Turbine (CT).	153 MW	Dry low No <sub>x</sub> combustion control and starter package.
1	Steam turbine	171 MW	Condensing reheat type.
3	Generator.	193 MVA	TEWAC or hydrogen cooling system.
2	CT inlet air filter.	640,000 CFM	
2	Inlet air-cooling.		Evaporative type.
2	Heat Recovery Steam Generator (HRSG).	420,000 lb./hr.	HP and LP
1	Fuel gas filter separator.	3,000 MMBTU/hr.	685 psig minimum inlet.
2	HRSG stack.	18' dia.x120' high	
2	CO catalyst.		Sized to achieve LACT/LAER.
2	Selective catalytic reduction (SCR).		Sized to achieve LACT/LAER.
1	Ammonia injection skid.		
1	Anhydrous ammonia storage tank.	12,000 gal.	
3	HP/IP HRSG feedwater pump.	100%	610 gpm each.
1	Service/Fire water storage.	1.0 million gal.	
2	Demineralized water pumps.	500 gpm	HP with interstage bleed.
1	Demineralized water treatment package.	500 gpm	
1	Demineralized water storage tank.	69,000 gal.	
1	Steam surface condenser.	1,040 mm Btu/h	
3	Condensate pump.	1,200 gpm	
3	Circulating water pump.	55,000 gpm	
1	Wet cooling tower.	1,040 mm Btu/h	
1	Firewater pump skid.	2-500 gpm pumps	
1	Oily water separator.		
3	Step-up transformer.	18.3 – 230 kV	To electrical grid.

**Table 2: Major Structures, Equipment and Associated Foundations**

Quantity	Description	Dimensions (ft)*		
		Length	Width	Height
2	Combustion gas turbine generator and starter package (CT).	75	45	45
2	CT air inlet filter with air cooling.	35	35	35
3	Generator with enclosure.	40	20	25
2	Heat recovery steam generator (HRSG).	78	50	97
2	HRSG stack.		18 dia.	120
2	Generator breaker.	15	20	25
1	Steam turbine and condenser.	45	50	30
1	Wet cooling tower.	330	51	35
2	Auxiliary transformer.	25	25	25
3	Step-up transformer.	45	30	25
1	Demineralized water storage tank.	--	20 dia.	30
1	Fire/Service water storage tank.	--	60 dia.	45
1	Anhydrous ammonia storage tank.	20	12 dia.	12,000 gal.
1	Control building.	80	50	15
1	Administration.	80	50	15
1	Water treatment building.	80	50	20
1	Warehouse.	100	60	20
1	Guard house	15	10	10

**\*All capacities and dimensions are approximate and may change during project final design.**

**GEN-3** The project owner shall make payments to the CBO for design review, plan check and construction inspection, equivalent to the fees listed in the 1998 CBC, Chapter 1, Section 107 and Table 1-A, Building Permit Fees; Appendix Chapter 33, Section 3310 and Table A-33-A, Grading Plan Review Fees; and Table A-33-B, Grading Permit Fees. If Kern County has adjusted the CBC fees for design review, plan check and construction inspection, the project owner shall pay the adjusted fees.

**Verification:** The project owner shall make the required payments to the CBO at the time of submittal of the plans, design calculations, specifications, or soil reports. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next Monthly Compliance Report indicating that the applicable fee has been paid.

**GEN-4** Prior to the start of rough grading, the project owner shall assign a California registered architect, structural engineer or civil engineer, as a resident engineer (RE), to be in general responsible charge of the project [Building Standards Administrative Code (Cal. Code Regs., tit. 24, § 4-209, Designation of Responsibilities).]

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project respectively. A project may be divided into parts, provided each part is clearly defined as a distinct

unit. Separate assignment of general responsible charge may be made for each designated part.

Protocol: The RE shall:

115. Monitor construction progress to ensure compliance with LORS;
116. Ensure that construction of all the facilities conforms in every material respect to the applicable LORS, these Conditions of Certification, approved plans, and specifications;
117. Prepare documents to initiate changes in the approved drawings and specifications when directed by the project owner or as required by conditions on the project;
118. Be responsible for providing the project inspectors and testing agency(ies) with complete and up-to-date set(s) of stamped drawings, plans, specifications and any other required documents;
119. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and
120. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests as not conforming to the approved plans and specifications.

The RE shall have the authority to halt construction and to require changes or remedial work, if the work does not conform to applicable requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the name, qualifications and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) are subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.



**GEN-5** Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project: A) a civil engineer; B) a geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering; C) a design engineer, who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; D) a mechanical engineer; and E) an electrical engineer. [California Business and Professions Code section 6704 et seq., and sections 6730 and 6736. Requires state registration to practice as a civil engineer or structural engineer in California.]

The tasks performed by the civil, mechanical, electrical or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all engineers assigned to the project. [1998 CBC, Section 104.2, Powers and Duties of Building Official.]

If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Protocol: A: The civil engineer shall:

121. Design, or be responsible for design, stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads, and sanitary sewer systems; and
122. Provide consultation to the RE during the construction phase of the project, and recommend changes in the design of the civil works facilities and changes in the construction procedures.

Protocol: B: The geotechnical engineer or civil engineer, experienced and knowledgeable in the practice of soils engineering, shall:

Review all the engineering geology reports, and prepare final soils grading report;

123. Prepare the soils engineering reports required by the 1998 CBC, Appendix Chapter 33, Section 3309.5 – Soils Engineering Report, and Section 3309.6 – Engineering Geology Report;

124. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 1998 CBC, Appendix Chapter 33, section 3317, Grading Inspections;
125. Recommend field changes to the civil engineer and RE;
126. Review the geotechnical report, field exploration report, laboratory tests, and engineering analyses detailing the nature and extent of the site soils that may be susceptible to liquefaction, rapid settlement or collapse when saturated under load; and
127. Prepare reports on foundation investigation to comply with the 1998 CBC, Chapter 18 section 1804, Foundation Investigations.

This engineer shall be authorized to halt earthwork and to require changes; if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations. [1998 CBC, section 104.2.4, Stop orders.]

Protocol: C: The design engineer shall:

128. Be directly responsible for the design of the proposed structures and equipment supports;
129. Provide consultation to the RE during design and construction of the project;
130. Monitor construction progress to ensure compliance with LORS;
131. Evaluate and recommend necessary changes in design; and
132. Prepare and sign all major building plans, specifications and calculations.

Protocol: D: The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform with all of the mechanical engineering design requirements set forth in the Energy Commission's Decision.

Protocol: E: The electrical engineer shall:

133. Be responsible for the electrical design of the project; and
134. Sign and stamp electrical design drawings, plans, specifications, and calculations.

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

**GEN-6** Prior to the start of an activity requiring special inspection, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 1998 CBC, Chapter 17, Section 1701, Special Inspections, Section, 1701.5 Type of Work (requiring special inspection), and Section 106.3.5, Inspection and observation program.

Protocol: The special inspector shall:

135. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;
136. Observe the work assigned for conformance with the approved design drawings and specifications;
137. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM; and
138. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the applicable provisions of the applicable edition of the CBC.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME), as applicable shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

**Verification:** At least 15 days prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO's approval of the qualifications of all special inspectors in the next Monthly Compliance Report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

**GEN-7** The project owner shall keep the CBO informed regarding the status of engineering and construction. If any discrepancy in design and/or construction is discovered, the project owner shall document the discrepancy and recommend the corrective action required. The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, the applicable sections of the CBC and/or other LORS.

**Verification:** The project owner shall submit monthly construction progress reports to the CBO and CPM. The project owner shall transmit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

**GEN-8** The project owner shall obtain the CBO's final approval of all completed work. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. When the work and the "as-built" and "as graded" plans conform to the approved final plans, the project owner shall notify the CPM regarding the CBO's final approval. The marked up "as-built" drawings for the construction of structural and architectural work shall be submitted to the CBO. Changes approved by the CBO shall be identified on the "as-built" drawings [1998 CBC, Section 108, Inspections.]

**Verification:** Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans.

**GEN-9** The project owner shall file a closure/decommissioning plan with Kern County and the CPM for review and approval at least 12 months (or other mutually agreed to time) prior to commencing the closure activities. If the project is abandoned before construction is completed, the project owner shall return the site to its original condition.

**Protocol:** The closure plan shall include a discussion of the following:

139. The proposed closure/decommissioning activities for the project and all appurtenant facilities constructed as part of the project;
140. All applicable LORS, all local/regional plans, and a discussion of the conformance of the proposed decommissioning activities to the applicable LORS and local/regional plans;
141. Activities necessary to restore the site if the EHPP decommissioning plan requires removal of all equipment and appurtenant facilities; and

142. Closure/decommissioning alternatives, other than complete restoration of the site.

**Verification:** At least 12 months prior to closure or decommissioning activities, the project owner shall file a copy of the closure/decommissioning plan with Kern County and the CPM for review and approval. Prior to the submittal of the closure plan, a meeting shall be held between the project owner and the CPM for discussing the specific contents of the plan.

**CIVIL-1** Prior to the start of site grading, the project owner shall submit to the CBO for review and approval the following:

- 143. Design of the proposed drainage structures and the grading plan;
- 144. An erosion and sedimentation control plan;
- 145. Related calculations and specifications, signed and stamped by the responsible civil engineer; and
- 146. Soils report as required by the 1998 CBC, Appendix Chapter 33, Section 3309.5, Soils Engineering Report and Section 3309.6, Engineering Geology Report.

**Verification:** At least 15 days prior to the start of rough or site grading, the project owner shall submit the documents described above to the CBO for review and approval. In the next Monthly Compliance Report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

**CIVIL-2** The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible geotechnical engineer or civil engineer experienced and knowledgeable in the practice of soils engineering identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area. [1998 CBC, Section 104.2.4, Stop orders.]

**Verification:** The project owner shall notify the CPM, within five days, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within five days of the CBO's approval, the project owner shall provide to the CPM a copy of the CBO's approval to resume earthwork and construction in the affected areas.

**CIVIL-3** The project owner shall perform inspections in accordance with the 1998 CBC, Chapter 1, Section 108, Inspections, Chapter 17, Section 1701.6, Continuous and Periodic Special Inspection and Appendix Chapter 33,

Section 3317, Grading Inspection. All plant site-grading operations shall be subject to inspection by the CBO and the CPM.

If, in the course of inspection, it is discovered that the work is not being done in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report detailing all discrepancies and non-compliance items, and the proposed corrective action, and send copies to the CBO and the CPM.

**Verification:** Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a Non-Conformance Report (NCR), and the proposed corrective action. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs, for the reporting month, shall also be included in the following Monthly Compliance Report.

**CIVIL-4** After completion of finished grading and erosion and sedimentation control and drainage facilities, the project owner shall obtain the CBO's approval of the final "as-graded" grading plans, and final "as-built" plans for the erosion and sedimentation control facilities [1998 CBC, Section 109, Certificate of Occupancy.]

**Verification:** Within 30 days of the completion of the erosion and sediment control mitigation and drainage facilities, the project owner shall submit to the CBO the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes. The project owner shall submit a copy of this report to the CPM in the next Monthly Compliance Report.

**STRUC-1** Prior to the start of any increment of construction, the project owner shall submit to the CBO for review and approval the proposed lateral force procedures for project structures and the applicable designs, plans and drawings for project structures. Proposed lateral force procedures, designs, plans and drawings shall be those for:

- 147. Major project structures;
- 148. Major foundations, equipment supports and anchorage;
- 149. Large field fabricated tanks;
- 150. Turbine/generator pedestal; and
- 151. Switchyard structures.

In addition, the project owner shall, prior to the start of any increment of construction, get approval from the CBO of the lateral force procedures proposed for project structures to comply with the lateral force provisions of the CBC.

Protocol: The project owner shall:

152. Obtain approval from the CBO of lateral force procedures proposed for project structures;
153. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (i.e., highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications [1998 CBC, Section 108.4, Approval Required];
154. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures at least 90 days (or a lesser number of days mutually agreed to by the project owner and the CBO), prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation [1998 CBC, Section 106.4.2, Retention of plans and Section 106.3.2, Submittal documents.]; and
155. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations and specifications shall be signed and stamped by the responsible design engineer [1998 CBC, Section 106.3.4, Architect or Engineer of Record.]

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of any increment of construction, the project owner shall submit to the CBO, with a copy to the CPM, the responsible design engineer's signed statement that the final design plans, specifications and calculations conform with all of the requirements set forth in the Energy Commission's Decision.

If the CBO discovers non-conformance with the stated requirements, the project owner shall resubmit the corrected plans to the CBO within 20 days of receipt of the nonconforming submittal with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and are in conformance with the requirements set forth in the applicable LORS.

**STRUC-2** The project owner shall submit to the CBO the required number of sets of the following:

156. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);
157. Concrete pour sign-off sheets;
158. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);
159. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and
160. Reports covering other structure activities requiring special inspections shall be in accordance with the 1998 CBC, Chapter 17, Section 1701, Special Inspections, Section 1701.5, Type of Work (requiring special inspection), Section 1702, Structural Observation and Section 1703, Nondestructive Testing.

**Verification:** If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

**STRUC-3** The project owner shall submit to the CBO design changes to the final plans required by the 1998 CBC, Chapter 1, Section 106.3.2, Submittal documents, and Section 106.3.3, Information on plans and specifications, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give the CBO prior notice of the intended filing.

**Verification:** On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the Monthly Compliance Report, when the CBO has approved the revised plans.



**STRUC-4** Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in Chapter 3, Table 3-E of the 1998 CBC shall, at a minimum, be designed to comply with Occupancy Category 2 of the 1998 CBC. Chapter 16, Table 16-K of the 1998 CBC requires use of the following seismic design criteria:  $I = 1.25$ ,  $I_p = 1.5$  and  $I_w = 1.15$ .

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of installation of the tanks or vessels containing the above specified quantities of highly toxic or explosive substances that would be hazardous to the safety of the general public if released, the project owner shall submit to the CBO for review and approval, final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following Monthly Compliance Report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

**MECH-1** Prior to the start of any increment of piping construction, the project owner shall submit, for CBO review and approval, the proposed final design drawings, specifications and calculations for each plant piping system (exclude domestic water, refrigeration systems, and small bore piping, i.e., piping and tubing with a diameter less than two and one-half inches). The submittal shall also include the applicable QA/QC procedures. The project owner shall design and install all piping, other than domestic water, refrigeration, and small bore piping to the applicable edition of the CBC. Upon completion of construction of any piping system, the project owner shall request the CBO's inspection approval of said construction [1998 CBC, Section 106.3.2, Submittal documents, Section 108.3, Inspection Requests.]

**Protocol:** The responsible mechanical engineer shall submit a signed and stamped statement to the CBO when:

161. The proposed final design plans, specifications and calculations conform with all of the piping requirements set forth in the Energy Commission's Decision; and
162. All of the other piping systems, except domestic water, refrigeration systems and small bore piping have been designed, fabricated and installed in accordance with all applicable ordinances, regulations, laws and industry standards, including, as applicable:
  - American National Standards Institute (ANSI) B31.1 (Power Piping Code);
  - ANSI B31.2 (Fuel Gas Piping Code);
  - ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);

- ANSI B31.8 (Gas Transmission and Distribution Piping Code); and
- Specific City/County code.

The CBO may require the project owner to employ special inspectors to report directly to the CBO to monitor shop fabrication or equipment installation [1998 CBC, Section 104.2.2, Deputies.]

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of any increment of piping construction, the project owner shall submit to the CBO for approval, with a copy of the transmittal letter to the CPM, the above listed documents for that increment of construction of piping systems, including a copy of the signed and stamped engineer's certification of conformance with the Energy Commission's Decision. The project owner shall transmit a copy of the CBO's inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

**MECH-2** For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by the applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of said installation [1998 CBC, Section 108.3 – Inspection Requests.]

**Protocol:** The project owner shall:

163. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and
164. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for review and approval, final design plans, specifications and calculations, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall send copies of the CBO plan check approvals to the CPM in the following Monthly Compliance Report. The project owner shall also transmit a

copy of the CBO's and/or Cal-OSHA inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

**MECH-3** Prior to the start of construction of any heating, ventilating, air conditioning (HVAC) or refrigeration system, the project owner shall submit to the CBO for review and approval the design plans, specifications, calculations and quality control procedures for that system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the applicable edition of the CBC. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of said construction. The final plans, specifications and calculations shall include approved criteria, assumptions and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS [1998 CBC, Section 108.7, Other Inspections; Section 106.3.4, Architect or Engineer of Record.]

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the applicable edition of the CBC, with a copy of the transmittal letter to the CPM.

The project owner shall send copies of CBO comments and approvals to the CPM in the next Monthly Compliance Report. The project owner shall transmit a copy of the CBO's inspection approvals to the CPM in the Monthly Compliance Report following completion of any inspection.

**MECH-4** Prior to the start of each increment of plumbing construction, the project owner shall submit for CBO's approval the final design plans, specifications, calculations, and QA/QC procedures for all plumbing systems, potable water systems, drainage systems (including sanitary drain and waste), toilet rooms, building energy conservation systems, and temperature control and ventilation systems, including water and sewer connection permits issued by the local agency. Upon completion of any increment of construction, the project owner shall request the CBO's inspection approval of said construction [1998 CBC, Section 108.3, Inspection Requests, Section 108.4, Approval Required.]

**Protocol:** The project owner shall design, fabricate and install:

165. Plumbing, potable water, all drainage systems, and toilet rooms in accordance with Title 24, California Code of Regulations, Division 5, Part 5 and the

- California Plumbing Code (or other relevant section(s) of the currently adopted California Plumbing Code and Title 24, California Code of Regulations); and
166. Building energy conservation systems and temperature control and ventilation systems in accordance with Title 24, California Code of Regulations, Division 5, Chapter 2-53, Part 2.

The final plans, specifications and calculations shall clearly reflect the inclusion of approved criteria, assumptions and methods used to develop the design. In addition, the responsible mechanical engineer shall stamp and sign all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with all of the requirements set forth in the Energy Commission's Decision.

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of construction of any of the above systems, the project owner shall submit to the CBO the final design plans, specifications and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the applicable edition of the CBC, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

The project owner shall transmit a copy of the CBO's inspection approvals to the CPM in the next Monthly Compliance Report following completion of that increment of construction.

**ELEC-1** For the 480 volts and higher systems, the project owner shall not begin any increment of electrical construction until plans for that increment have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS [1998 CBC, Section 108.4, Approval Required, and Section 108.3, Inspection Requests.]

**Protocol:** The following activities shall be reported in the Monthly Compliance Report:

167. receipt or delay of major electrical equipment;
168. testing or energization of major electrical equipment; and
169. the number of electrical drawings approved, submitted for approval, and still to be submitted.

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations for electrical equipment and

systems 480 volts and greater, including a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

**ELEC-2** The project owner shall submit to the CBO the required number of copies of items A and B for review and approval and one copy of item C [CBC 1998, Section 106.3.2, Submittal documents.]

A. Final plant design plans to include:

1. one-line diagrams for the 13.8 kV, 4.16 kV and 480 V systems;
2. system grounding drawings;
3. general arrangement or conduit drawings; and
4. other plans as required by the CBO.

B. Final plant calculations to establish:

1. short-circuit ratings of plant equipment;
2. ampacity of feeder cables;
3. voltage drop in feeder cables;
4. system grounding requirements;
5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 480 V systems;
6. system grounding requirements;
7. lighting energy calculations; and
8. other reasonable calculations as customarily required by the CBO.

C. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission Decision.

**Verification:** At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of each increment of electrical equipment installation, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations, for electrical equipment and systems 480 volts and greater enumerated above, including a copy of the signed and stamped statement from the responsible electrical engineer certifying compliance with the applicable LORS. The project owner shall send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

## REFERENCES

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- CEC (California Energy Commission). 1999a. CEC staff data requests, set no. 1, Elk Hills Power Project (99-AFC-1). Submitted to Elk Hills Power, LLC, July 2, 1999.
- CEC (California Energy Commission). 1999b. CEC staff data requests, set no. 2, Elk Hills Power Project (99-AFC-1). Submitted to Elk Hills Power, LLC, August 24, 1999.
- CURE (California Unions for Reliable Energy). 1999a. CURE data requests, set no. 1, request no. 1, Elk Hills Power Project (99-AFC-1). Submitted to Elk Hills Power, LLC, July 19, 1999.
- CURE (California Unions for Reliable Energy). 1999b. CURE, data requests, set no. 2, requests nos. 2 through 146, Elk Hills Power Project (99-AFC-1). Submitted to Elk Hills Power, LLC, August 9, 1999.
- EHPP (Elk Hills Power Project). 1999a. Application for Certification, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, February 24.
- EHPP (Elk Hills Power Project). 1999b. Application for Certification, Addendum I, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, March 14, 1999.
- EHPP (Elk Hills Power Project). 1999c. Response to California Energy Commission (CEC) staff data requests nos. 1-44, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, August 3, 1999.
- EHPP (Elk Hills Power Project). 1999d. Response to California Energy Commission (CEC) staff data requests, nos. 9, 11, 12, 28c, 31, 34 and 35, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, August 11, 1999.
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# POWER PLANT RELIABILITY

Testimony of Steve Baker

## INTRODUCTION

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In this analysis, staff addresses the reliability issues of the project to determine if the power plant is likely to be built in accordance with typical industry norms for reliability of power generation. Staff uses this level of reliability as a benchmark because the resulting project would likely not degrade the overall reliability of the electric system it serves.

The scope of this power plant reliability analysis covers:

- Equipment availability;
- Plant maintainability;
- Fuel and water availability; and
- Power plant reliability in relation to natural hazards.

Staff examined the project design criteria to determine if the project is likely to be built in accordance with typical industry norms for reliability of power generation. While Elk Hills Power, LLC (EHP) has predicted a level of reliability for the power plant (see below), staff believes EHP should not be held responsible for achieving this goal, so long as the plant's reliability matches or exceeds that of similar plants.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

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Presently, there are no laws, ordinances, regulations or standards (LORS) that establish either power plant reliability criteria or procedures for attaining reliable operation. However, the commission must make findings as to the manner in which the project is to be designed, sited and operated to ensure safe and reliable operation (Cal. Code Regs., tit. 20, § 1752(c)). Staff takes the approach that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This is likely the case if the project exhibits reliability at least equal to that of other power plants on that system.

## SETTING

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In the regulated monopoly electric industry of past decades, the utility companies assured overall system reliability, in part, by maintaining a "reserve margin." This amounted to having on call, at all times, sufficient generating capacity, in the form of standby power plants, to quickly handle unexpected outages of generating or transmission facilities. The utilities generally maintained a seven- to ten-percent reserve margin, meaning that sufficient capacity was on call to quickly replace from seven to ten percent of total system resources. This margin proved adequate, in part because of the reliability of the power plants that constituted the system.

Now, in the newly restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the California Independent System Operator (Cal-ISO), a newly-formed entity that will work with the California Power Exchange to purchase, dispatch and sell electric power throughout the state. How Cal-ISO will ensure system reliability is only now being determined; protocols are being developed and put in place that will, it is anticipated, allow sufficient reliability to be maintained under the competitive market system. “Must-run” power purchase agreements and “participating generator” agreements are two mechanisms currently being considered to ensure an adequate supply of reliable power (Mavis 1998, pers. comm.).

The Cal-ISO also requires those power plants selling ancillary services, as well as those holding reliability must-run contracts, to fulfill certain requirements, including:

- filing periodic reports on plant reliability;
- reporting all outages and their causes; and
- scheduling all planned maintenance outages with the Cal-ISO (Detmers 1999, pers. comm.).

The Cal-ISO’s mechanisms to ensure adequate power plant reliability apparently are being devised under the assumption that the individual power plants that compete to sell power into the system will each exhibit a level of reliability similar to that of power plants of past decades. However, there is cause to believe that, under free market competition, financial pressures will act to reduce the reliability of many power plants, both existing and newly constructed (McGraw-Hill 1994). It is possible that, if significant numbers of power plants exhibit individual reliability sufficiently lower than this historical level, the assumptions used by Cal-ISO to ensure system reliability will prove invalid, with potentially disappointing results. Until the restructured competitive electric power system has undergone a shakeout period, and the effects of varying power plant reliability are understood and compensated for, staff deems it wise to encourage power plant owners to continue to build and operate their projects to the level of reliability to which all in the industry have become accustomed.

EHP proposes to operate the Elk Hills Power Project (EHPP) as a 500 MW baseload and load following unit operating at output levels from 30 to 100 percent of baseload at an overall annual availability factor between 92 and 96 percent (EHPP 1999a, AFC §§ 1.7, 3.4.2, 3.9, 4.3.1). EHP further plans to sell reliability-related power services, including regulation, operating (spinning) reserves, reactive power, and perhaps black start capability (EHPP 1999a, AFC § 3.9).

## ANALYSIS

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A reliable power plant is one that is available when called upon to operate. Achieving this reliability is accomplished by ensuring adequate levels of equipment availability, plant maintainability, fuel and water availability, and resistance to natural



hazards. Staff examines these factors for the EHPP and compares them to industry norms. If they compare favorably, staff can conclude that the EHPP will not degrade utility system reliability.

Throughout its intended life, the project will be expected to perform reliably in baseload and load following duty. Power plant systems must be able to operate for extended periods (sometimes for months on end) without shutting down for maintenance or repairs. This requirement for equipment availability is typically addressed by control of quality in machinery design, construction, and installation. Plant reliability is further assured by providing for plant maintainability and sufficient redundancy of critical equipment, fuel and water availability, and resistance to natural hazards.

## **EQUIPMENT AVAILABILITY**

Equipment availability will be ensured by use of appropriate quality assurance/quality control (QA/QC) programs during design, procurement, construction and operation of the plant, and by providing for adequate maintenance and repair of the equipment and systems (discussed below).

### ***QA/QC PROGRAM***

The QA/QC program delineated by EHP (EHPP 1999a, AFC § 4.3.5) describes a program typical of the power industry. Equipment and supplies will be purchased from qualified suppliers, suppliers' QA/QC programs will be audited, and construction and installation will be inspected, all in accordance with the QA plan. Staff expects implementation of this program to yield typical reliability of design and construction. To ensure such implementation, staff has proposed appropriate conditions of certification under the portion of this document entitled Facility Design.

## **PLANT MAINTAINABILITY**

### ***EQUIPMENT REDUNDANCY***

A generating facility called on to operate in baseload and load following service for long periods of time must be capable of being maintained while operating. A typical approach for achieving this is to provide redundant examples of those pieces of equipment most likely to require service or repair.

EHP plans to provide some redundancy of function (EHPP 1999a, AFC §§ 3.4.4.3, 3.4.4.4, 3.4.6.2, 3.4.11.3, 4.3.2, Table 4.3-1). For example:

- The following plant components are provided in a set of three 100 percent capacity units:
  - boiler feed pumps.
- The following plant components are provided in sets of two 100 percent capacity units:
  - condensate pumps;
  - air compressors;

- water treatment system pumps; and
- service water pumps and heat exchangers.
- The following plant components are provided in a set of three 50 percent capacity units:
  - plant water supply pumps;
  - circulating water pumps; and
  - reverse osmosis trains.
- The computerized control and protective system for the gas turbine generators and HRSGs, known as the Distributed Control and Information System (DCIS), will exhibit typical redundancy.

While some power plants may exhibit slightly greater levels of equipment redundancy, the fact that the project consists of two parallel trains of gas turbine generators/HRSGs provides inherent reliability. Failure of a non-redundant component of one train should not cause the other train to fail, thus allowing the plant to continue to generate (at reduced output). With this opportunity for continued operation in the face of equipment failure, staff believes that the equipment redundancy described here represents an adequate design approach for a project such as this.

### ***MAINTENANCE PROGRAM***

EHP proposes to establish a plant maintenance program typical of the industry (EHPP 1999a, AFC § 4.3.1). This program will begin with review of designs and procurement specs for maintainability, and will include monitoring of equipment performance and condition, record keeping, and appropriate maintenance work. In conjunction with an overall plant quality control program (EHPP 1999a, AFC § 4.3.5), staff expects that this will allow the project to be adequately maintained to ensure acceptable reliability.

### **FUEL AND WATER AVAILABILITY**

For any power plant, the long-term availability of fuel and of water for cooling or process use is necessary to ensure reliability. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant may be curtailed, threatening the supply of power as well as the economic viability of the plant.

### ***FUEL AVAILABILITY***

The EHPP will burn locally produced natural gas from the surrounding Elk Hills Oil & Gas Field, transmitted to the plant via a new 2,500 foot long, ten-inch diameter pipeline that originates at an existing 20-inch diameter pipeline. This existing line connects, in turn, to the 36-inch diameter Mojave interstate gas pipeline, which is part of an interstate network of gas supply pipelines.

The Elk Hills Oil and Gas Field holds gas reserves more than adequate to supply the project's needs for 30 years (the intended plant life); the field's resources are estimated at 1,200 billion cubic feet (BCF), compared to the 754 BCF the project will consume. Should the Elk Hills Oil and Gas Field be depleted before the EHPP's

economic lifetime has passed, gas can be drawn from the Mojave pipeline system. This offers access to far more gas than the plant would require (EHPP 1999a, AFC §§ 1.6.5, 3.4.5, 4.3.3). Staff agrees with EHP's prediction that there will be adequate natural gas supply and pipeline capacity to meet the project's needs.

### ***WATER SUPPLY RELIABILITY***

Water for the EHPP will be supplied by the West Kern Water District under long-term contract (EHPP 1999a, AFC §§ 1.6.6, 3.1, 3.4.6, 3.7.2, 4.3.4). Water will be pumped through a new 9.8-mile long, 16-inch diameter pipeline by three 50 percent capacity pumps and stored in a one million gallon raw water storage tank. Staff regards this arrangement as an adequately reliable supply. (Please refer to that portion of this document entitled Soil and Water Resources.)

### **POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS**

Natural forces can threaten the reliable operation of a power plant. High winds, flooding, tsunamis (tidal waves) and seiches (waves in inland bodies of water) will not likely represent a hazard for this project, but seismic shaking (earthquake) presents a credible threat to reliable operation (see that portion of this document entitled Facility Design).

### ***SEISMIC SHAKING***

The site lies within Seismic Zone 4. The project will be designed and constructed to the latest appropriate LORS. Compliance with current LORS applicable to seismic design represents an upgrading of performance during seismic shaking, compared to older facilities, due to the fact that these LORS have been periodically and continually upgraded. (Please see that section of this document entitled Facility Design.) By virtue of being built to the latest seismic design LORS, this project will likely perform at least as well as, and perhaps better than, existing plants in the electric power system. In light of the historical performance of California power plants and the electrical system in seismic events, staff believes there is no special concern with power plant functional reliability affecting the electric system's reliability due to seismic events.

### **COMPARISON WITH EXISTING FACILITIES**

Industry statistics for availability factors (as well as many other related reliability data) are kept by the North American Electric Reliability Council (NERC). NERC continually polls utility companies throughout the North American continent on project reliability data through its Generating Availability Data System (GADS), and periodically summarizes and publishes the statistics on the Internet (<http://www.nerc.com>). NERC reports the following summary generating unit statistics for the years 1993 through 1997 (NERC 1998):

#### **For Combined Cycle units (All MW sizes)**

Availability Factor = 91.10 percent

The GE gas turbines that will be employed in the project have been on the market for several years now, and can be expected to exhibit typically high availability. EHP's prediction of an annual availability factor from 92 to 96 percent (EHPP 1999a, AFC §§ 1.7, 3.4.2, 3.9, 4.3.1) is not out of line with the NERC figure for similar plants throughout North America (see above). In fact, these new, large machines can well be expected to outperform the fleet of various gas turbines that make up the NERC statistics. Further, since the plant will consist of two parallel gas turbine generating trains, maintenance can be scheduled during those times of year when the full plant output is not required to meet market demand, typical of industry standard maintenance procedures (EHPP 1999a, AFC §§ 4.3.1, 4.3.5). This practice holds out the promise of adequately high plant availability. EHP's estimate of plant availability therefore appears realistic. The stated procedures for assuring design, procurement and construction of a reliable power plant appear to be in keeping with industry norms, and staff believes they are likely to yield an adequately reliable plant.

## **FACILITY CLOSURE**

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Closure of the facility, whether planned or unplanned, cannot impact project reliability. Reliability impacts on the electric system from facility closure, should there be any, are dealt with in that portion of this document entitled Transmission System Engineering.

## **CONCLUSION**

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EHP predicts an equivalent availability factor from 92 to 96 percent, which agrees well with the industry norm of 91 percent for this type of plant. Based on a review of the proposal, staff concludes that the plant will be built and operated in a manner consistent with industry norms for reliable operation. This should provide an adequate level of reliability. No impacts, individual or cumulative, are possible from the operation or closure of this project.

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# POWER PLANT EFFICIENCY

Testimony of Steve Baker

## INTRODUCTION

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The Energy Commission makes findings as to whether energy use by the Elk Hills Power Project (EHPP) will result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that the EHPP's consumption of energy creates a significant adverse impact, it must determine whether there are any feasible mitigation measures that could eliminate or minimize the impacts. In this analysis, staff addresses the issue of inefficient and unnecessary consumption of energy.

In order to support the Energy Commission's findings, this analysis will:

- determine whether the facility will likely present any adverse impacts upon energy resources;
- determine whether these adverse impacts are significant; and if so,
- determine whether feasible mitigation measures exist that would eliminate the adverse impacts, or reduce them to a level of insignificance.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS

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### FEDERAL

No federal laws apply to the efficiency of this project.

### STATE

#### ***CALIFORNIA ENVIRONMENTAL QUALITY ACT GUIDELINES***

CEQA Guidelines state that the environmental analysis "...shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Cal. Code Regs., tit. 14, § 15126.4(a)(1)). Appendix F of the Guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce wasteful, inefficient and unnecessary consumption of energy (Cal. Code regs., tit. 14, § 15000 et seq., Appendix F).

### LOCAL

No local or county ordinances apply to power plant efficiency.

## SETTING

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Elk Hills Power, LLC (EHP) proposes to construct and operate a (nominal) 500 MW combined cycle power plant to generate baseload and load-following power and various ancillary services (EHPP 1999a, §§ 1.7, 2.1, 3.9). The EHPP will consist of two F-class combustion turbine generators with evaporative inlet air coolers and steam injection producing approximately 153 MW each, two heat recovery steam generators (HRSGs) with duct burners, and one 171 MW steam turbine generator, totaling 477 MW (EHPP 1999a, §§ 1.1, 3.4.2, 3.4.3.1, 3.4.3.2). With the duct burners supplying injection steam to the gas turbines, gas turbine output increases to 166 MW each, and total plant output rises to 503 MW (EHPP 1999a, Figs. 3.4-4 and 3.4-5).

## ANALYSIS

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### ADVERSE IMPACTS ON ENERGY RESOURCES

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- adverse effects on local and regional energy supplies and energy resources;
- a requirement for additional energy supply capacity;
- noncompliance with existing energy standards; or
- the wasteful, inefficient and unnecessary consumption of fuel or energy.

### *PROJECT ENERGY REQUIREMENTS AND ENERGY USE EFFICIENCY*

Any power plant large enough to fall under Energy Commission siting jurisdiction will consume large amounts of energy. The EHPP will burn natural gas at a maximum rate exceeding 71 billion Btu per day (EHP 1999a, Fig. 3.4-4). This is a substantial rate of energy consumption, and holds the potential to impact energy supplies.

Under expected project conditions, electricity will be generated at a peak load efficiency of approximately 53.6 percent LHV<sup>1</sup> (EHPP 1999a, Fig. 3.4-4); compare this to the average fuel efficiency of a typical utility company baseload power plant at approximately 35 percent LHV.

### *ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES*

EHP has described its sources of supply of natural gas for the EHPP (EHPP 1999a, §§ 1.1, 1.6.2, 1.6.5, 3.1, 3.4.5, 4.3.3). The project will burn locally-produced natural gas from the surrounding Elk Hills Oil and Gas Field. The existing gas supply infrastructure is connected to the Mojave gas pipeline; should the Elk Hills Oil and

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<sup>1</sup> Lower heating value



Gas Field eventually become exhausted, fuel for the project could be supplied from the Mojave pipeline. The EHPP would thus have access to supplies from the Southwest. These sources represent far more gas than would be required for a project this size. It is therefore highly unlikely that the EHPP could pose a substantial increase in demand for natural gas in California.

### ***ADDITIONAL ENERGY SUPPLY REQUIREMENTS***

Natural gas fuel will be supplied to the project via a new 2,500-foot long, 10-inch diameter pipeline from an existing 20-inch diameter Elk Hills pipeline, an 800 psi<sup>2</sup> system connected to the Mojave pipeline (EHPP 1999a, §§ 1.6.5, 4.3.3). Even in the event that the Elk Hills gas field should become exhausted, the natural gas supply system in California is so large and well-established, there is no real likelihood that the EHPP will require development of new sources of energy.

### ***COMPLIANCE WITH ENERGY STANDARDS***

No standards apply to the efficiency of the EHPP or other non-cogeneration projects.

### ***ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT AND UNNECESSARY ENERGY CONSUMPTION***

The EHPP could be deemed to create significant adverse impacts on energy resources if alternatives existed that would reduce the project's use of fuel. Evaluation of alternatives to the project that could reduce wasteful, inefficient or unnecessary energy consumption first requires examination of the project's energy consumption. Project fuel efficiency, and therefore its rate of energy consumption, is determined by the configuration of the power producing system and by the selection of equipment used to generate power.

#### **PROJECT CONFIGURATION**

The EHPP will be configured as a compound-train combined cycle power plant, in which electricity is generated by two gas turbines, and additionally by a steam turbine that operates on heat energy recuperated from the gas turbines' exhaust. By recovering this heat, which would otherwise be lost up the exhaust stacks, the efficiency of any combined cycle power plant is increased considerably from that of either gas turbines or steam turbines operating alone. Such a configuration is well suited to the large, steady loads met by a baseload plant, intended to supply energy efficiently for long periods of time.

The number of turbines further contributes to efficiency at part load. Gas turbine generators operate most efficiently at one particular output level, typically at full load. Whenever desired output is less than full load, the unit must be throttled back. Rather than being forced to throttle back one large turbine, with the consequent reduction in efficiency, the power plant operator will have the option of shutting off one gas turbine. This allows the plant to generate at less than full load while maintaining optimum efficiency, suitable for a plant meant for flexible generation,

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<sup>2</sup> Pounds per square inch

such as load-following duty. Loads down to 50 percent of full load allow one gas turbine, operating at full load, and the steam turbine to maintain peak efficiency.

Additionally, for further operational flexibility, the HRSGs will be equipped with duct burners, to supply additional steam to be injected into the gas turbines for power augmentation (EHPP 1999a, § 1.7, 3.4.2, 3.9). This increases maximum power output, and extends the range of power outputs at which the plant can operate at optimum or near optimum efficiency.

#### EQUIPMENT SELECTION

Modern gas turbines embody the most fuel-efficient electric generating technology available today. The “F-class” gas turbines to be employed in the EHPP represent some of the most modern and efficient such machines now available. EHP will employ a combined cycle power train from a prominent manufacturer, the General Electric PG7241FA (known as the “Frame 7FA”), nominally rated in a two-on-one train combined cycle at 530 MW and 56.5 percent efficiency LHV at ISO<sup>3</sup> conditions (EHPP 1999a, § 3.4.3.1; EHPP 1999e, data response 2; GTW 1998)<sup>4</sup>.

A possible alternative is the Siemens-Westinghouse 501F, another F-class gas turbine nominally rated at 546 MW and 55.8 percent efficiency at ISO conditions in two-on-one train combined cycle configuration (GTW 1998). This machine was considered along with the GE machine in the original Application for Certification (AFC); EHPP has subsequently closed a deal with General Electric for the GE machines (EHPP 1999e, data response 2).

Another possible alternative is the ASEA Brown-Boveri KA-24, still another “F-class” machine. While the KA-24 promises slightly higher fuel efficiency (57.9 percent) (GTW 1998) than the other F-class machines, any differences among the three in actual operating efficiency will be insignificant. Selecting among these machines is thus based on other factors, such as generating capacity, cost, ability to meet air pollution limitations, and commercial availability. The ABB machine, for instance, is available only in one-on-one power trains, with one gas turbine and one steam turbine paired on a single shaft generating a nominal 271 MW (Orsini 1999, pers. comm.). The GE and Siemens-Westinghouse machines, which can be configured more flexibly, offer some advantage here.

#### EFFICIENCY OF ALTERNATIVES TO THE PROJECT

The project objectives include generation of baseload or load following electricity, as market conditions dictate, and the flexibility to tailor output to provide such ancillary services as peaking, operating reserves, reactive power, and possibly black start capability (EHPP 1999a, §§ 1.7, 2.1, 3.4.2, 3.9).

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<sup>3</sup> International Standards Organization (ISO) standard conditions are 15° C (59° F), 60 percent relative humidity, and one atmosphere of pressure (equivalent to sea level).

<sup>4</sup> Nominal, or expected, plant output of approximately 500 MW is significantly less than these figures, due chiefly to the location of the project site. Site altitude (1,330 feet above mean sea level)(EHPP 1999a, § 3.3) and average temperature conspire to reduce maximum power output and generation efficiency.

### ***Alternative Generating Technologies***

EHP addresses alternative generating technologies in its application (EHPP 1999a, § 3.11.4.2). Oil-burning, coal-burning, solar, wind, hydroelectric, biomass and geothermal technologies are all considered. Given the project objectives, location and air pollution control requirements, staff agrees with EHP that only natural gas-burning technologies are feasible.

### ***Natural Gas-Burning Technologies***

Fuel consumption is one of the most important economic factors in selecting an electric generator; fuel typically accounts for over two-thirds of the total operating costs of a fossil-fired power plant (Power 1994). Under a competitive power market system, where operating costs are critical in determining the competitiveness and profitability of a power plant, the plant owner is thus strongly motivated to purchase fuel efficient machinery.

Capital cost is also important in selecting generating machinery. Recent progress in the development of large, stationary gas turbines, aided by the incorporation into these machines of technological advances made in the development of aircraft jet engines, has created a situation in which several large manufacturers compete vigorously to sell their machines. This, combined with the cost advantages of assembly-line manufacturing, has driven down the prices of these machines. Thus, the power plant developer can purchase a turbine generator that not only offers the best available fuel efficiency, but at the same time sells for the lowest per-kilowatt capital cost.

One possible alternative to an F-class gas turbine is the Siemens-Westinghouse 501G gas turbine generator, which employs partial steam cooling to allow slightly higher temperatures, yielding greater efficiency. While the 501G is rated at 58 percent efficiency, 2.2 percent higher than the 501F, the G machine produces 367 MW to the 501F's 272 MW; a 500 MW power plant would thus not be practical. Instead, a single 501G would yield a 367 MW (nominal) plant, while a dual arrangement would yield a 726 MW plant. Given the minor efficiency improvement promised by the G-class turbine, and the likelihood that the plant will frequently be dispatched at less than full load, EHPP's decision to purchase "F-class" machines is a reasonable one.

A further choice of alternatives involves the selection of gas turbine inlet air cooling methods. The two commonly used techniques are the evaporative cooler and the chiller; both devices increase gas turbine power output by cooling the gas turbine inlet air. A chiller can offer greater power output than the evaporative cooler on hot, humid days, but consumes electric power to operate its refrigeration process, thus slightly reducing overall net power output and, thus, overall efficiency. An evaporative cooler boosts power output best on dry days; it uses less electric power than a chiller, thus yielding slightly higher operating efficiency. The difference in efficiency between these two techniques is so small as to be insignificant. EHP plans to install evaporative cooling, but suggests the possibility of later installing a chiller if economics justify the change (EHPP 1999a, §§ 3.4.2, 3.4.3.1, 3.4.6, 3.11.4.5). Given project climate and the relative lack of superiority of one system

over the other, staff deems this an approach that will yield no adverse energy impacts.

In conclusion, the project configuration (combined cycle) and generating equipment ("F-class" gas turbines) chosen appear to represent the most efficient feasible combination to satisfy the project objectives. There are no alternatives that could significantly reduce energy consumption.

## **CUMULATIVE IMPACTS**

Nearby power plant projects that hold the potential for cumulative impacts when aggregated with the EHPP include the La Paloma, Sunrise and Midway-Sunset Cogen West power plants. As discussed above, supplies of natural gas fuel, and the means for transporting this fuel to the facilities consuming it, are more than adequate. These several power plants will not strain the resource to a degree that could result in cumulative energy impacts.

## **FACILITY CLOSURE**

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Closure of the facility, whether planned or unplanned, will not influence, nor will it be influenced by, project efficiency. Any efficiency impacts due to closure of the project would be on the electric system as a whole. Yet the vast size of the electric system serving California, the number of generating plants offering to sell power into it, and the existence of the California Independent System Operator and Power Exchange to ensure the efficient management of the system, all lend assurance that closure of this facility will not produce significant adverse impacts on efficiency.

## **CONCLUSIONS AND RECOMMENDATIONS**

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### **CONCLUSIONS**

The EHPP, if constructed and operated as proposed, would generate 500 MW of electric power at an overall project fuel efficiency of approximately 56 percent. While it will consume substantial amounts of energy, it will do so in the most efficient manner practicable. It will not create significant adverse effects on energy supplies or resources, will not require additional sources of energy supply, and will not consume energy in a wasteful or inefficient manner. No energy standards apply to the project. Staff therefore concludes that the EHPP would present no significant adverse impacts upon energy resources.

No cumulative impacts on energy resource are likely. Facility closure would not likely present significant impacts on electric system efficiency.

### **RECOMMENDATION**

From the standpoint of energy efficiency, staff recommends certification of the EHPP. No Conditions of Certification are proposed.

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# TRANSMISSION SYSTEM ENGINEERING

Testimony of Mark Hesters and Al McCuen

## INTRODUCTION

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The Transmission System Engineering (TSE) analysis provides the basis for the findings in the Energy Commission's decision. This final staff assessment indicates whether or not the transmission facilities associated with the proposed project conform to all applicable laws, ordinances, regulations and standards (LORS) required for safe and reliable electric power transmission.

Elk Hills Power Company (Elk Hills) proposes to connect their project, the Elk Hills Power Project (EHPP) to Pacific Gas & Electric Company's (PG&E) transmission system. The California Independent System Operator (Cal-ISO) is responsible for ensuring electric system reliability for all participating transmission owning utilities and determines both the standards necessary to achieve reliability and whether a proposed project conforms with those standards. The Energy Commission will rely on the Cal-ISO's determinations to make its finding related to applicable reliability standards, the need for additional transmission facilities, and environmental review of the whole of the project. In this case, staff is primarily a facilitator, coordinating the Cal-ISO's process and results with the certification process and the Energy Commission decision. The Cal-ISO will provide testimony at the Energy Commission's hearings.

Staff's analysis also evaluates the power plant substation, outlet line, termination facilities and outlet alternatives identified by the applicant and provides proposed conditions of certification to ensure that the project complies with applicable LORS during the design, construction, operation and potential closure of the project.

Public Resources Code, section 25523 requires the Energy Commission to "prepare a written decision...which includes: ...findings regarding conformity of the proposed site and related facilities...with public safety standards...and with other relevant local, regional, state, and federal standards, ordinances, and laws." Under the California Environmental Quality Act (CEQA) the Energy Commission must conduct an environmental review of the "whole of the project," which may include facilities not licensed by the Energy Commission (CCR, tit. 14, §15378). Therefore, the Energy Commission must identify and evaluate the environmental effect of construction and operation of any new or modified transmission facilities beyond the project's interconnection with the existing transmission system that are required as a result of the power plant addition to the California transmission system.

## LAWS, ORDINANCES, REGULATIONS AND STANDARDS

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California Public Utilities Commission (CPUC) General Order 95 (GO-95), "Rules for Overhead Electric Line Construction", formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance, operation or use of overhead electric lines and to the public in general.

- CPUC Rule 21 provides standards for the reliable connection of parallel generating stations connected to participating transmission owners.
- Western Systems Coordinating Council (WSCC) Reliability Criteria provides the performance standards used in assessing the reliability of the interconnected system. These Reliability Criteria require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. The WSCC Reliability Criteria includes the Reliability Criteria for Transmission System Planning, Power Supply Design Criteria, and Minimum Operating Reliability Criteria. Analysis of the WSCC system is based to a large degree on WSCC Section 4 "Criteria for Transmission System Contingency Performance" which requires that the results of power flow and stability simulations verify established performance levels.

Performance levels are defined by specifying the allowable variations in voltage, frequency and loading that may occur on systems other than the one in which a disturbance originated. Levels of performance range from no significant adverse effect outside a system area during a minor disturbance (loss of load or facility loading outside emergency limits) to a performance level that only seeks to prevent system cascading and the subsequent blackout of islanded areas. While controlled loss of generation, load, or system separation is permitted in extreme circumstances, their uncontrolled loss is not permitted (WSCC 1998).

- North American Electric Reliability Council (NERC) Planning Standards provides policies, standards, principles and guides to assure the adequacy and security of the electric transmission system. With regard to power flow and stability simulations, these Planning Standards are similar to WSCC's Criteria for Transmission System Contingency Performance. The NERC planning standards provide for acceptable system performance under normal and contingency conditions, however the NERC planning standards apply not only to interconnected system operation but also to individual service areas (NERC 1998).
- Cal-ISO Reliability Criteria also provide policies, standards, principles and guides to assure the adequacy and security of the electric transmission system. With regard to power flow and stability simulations, these Planning Standards are similar to WSCC's Criteria for Transmission System Contingency Performance and the NERC Planning Standards. The Cal-ISO Reliability Criteria incorporate the WSCC Criteria and NERC Planning Standards. However, the Cal-ISO Reliability Criteria also provide some additional requirements that are not found in the WSCC Criteria or the NERC Planning Standards. The Cal-ISO Reliability Criteria apply to all existing and proposed facilities interconnecting to the Cal-ISO controlled grid.
- Cal-ISO Scheduling Protocols and Dispatch Protocols require conformance with NERC, WSCC, and Local Area Reliability and Planning Criteria. These standards will be applied to the assessment of the system reliability implications of the Elk Hills project. Also of major importance to the Elk Hills project, and other privately funded projects which may sell through the California Power Exchange (Cal-PX) are the Cal-ISO Day/Hour Ahead Inter-zonal Congestion



Management Scheduling Protocol (SP 10), the Transmission System Loss Management Scheduling Protocol (SP 4), and the Creation of the Real Time Merit Order Stack (SP 11). The Congestion Management Scheduling Protocol provides that the operation of power plants not violate system criteria when market participants request generation dispatch or the use of major interties. The Real Time Merit Order Stack is developed based on increasing energy bid prices so that the least cost bids are accepted early on and if congestion is anticipated the highest bids are not selected. The Transmission System Loss Management Scheduling Protocol uses the Cal-ISO power flow model to identify total transmission losses at each generating unit and scheduling point. Additional calculations are performed to determine net power output required by the generating units to meet their scheduled obligations (Cal-ISO 1998a, Cal-ISO 1998b).

- Cal-ISO Participating Generator Agreement consists of detailed explanations of the requirements in the Cal-ISO Tariff pertaining to the paralleled generating unit.

## **PROJECT DESCRIPTION**

The Elk Hills project is a combined cycle power project located in western Kern County. The project will have a nominal output of 500 MW. The project will be located on approximately 12 acres of land in the Elk Hills Oil and Gas Field, about 25 miles west of Bakersfield, California. Please refer to the Project Description section of this staff assessment for a more detailed presentation of the project site. This will be a merchant power plant that will sell electricity into the California market.

The Elk Hills project will access the California market through a new Elk Hills switching station or PG&E's Midway substation near Buttonwillow, California. Elk Hills is seeking certification for three transmission line routes, one of which will be used by the project. The first route, Transmission Route 1A, loops in to the existing Midway - Wheeler Ridge 230 kV line through a new Elk Hills switchyard. The second route, Transmission Route 1B, is a direct connection to the Midway substation through a new line built by Elk Hills (EHPP 1999a, pages 3-53 to 3-59). The third route, Transmission Route 1B Variation, replaces a portion of the existing Taft - Midway 115 kV line with a double circuit 230 kV line (EHPP 1999c, page 3). Figure 1 shows EHPP and Transmission Routes 1A and 1B. Route 1B Variation runs parallel to Route 1B.

### ***ELK HILLS SWITCHYARD***

The plant's three generators will be individually connected to 13.8/230 kV step-up transformers and then connected to the Elk Hills 230 kV ring bus switchyard (EHPP 1999a, pages 3-23 to 3-27). This is an acceptable configuration for the switchyard.

### ***TRANSMISSION LINE CHARACTERISTICS***

The conductors for line Routes 1A and 1B will form two three-phase 230 kV circuits. Each of the conductors will be made of 1590 kcmil aluminum conductor, steel reinforced (ACSR) code named "lapwing." At 230 kV each conductor will have a thermal rating of 588 MVA (EHPP 1999a, page 3-60). For the Transmission Route

1B Variation, the replacement conductor for the Taft – Midway 115 kV line has not been determined; however, a conductor like the 1590 kcmil ACSR is expected to be used (EHPP 1999c, pages 3 and 4). Condition of Certification **TSE- 1c** will assure that conductors are adequately sized.

## ***POLES***

All three line routes will use single shaft galvanized tubular steel poles up to the point of interconnection at either the substation for the Midway – Wheeler Ridge loop-in or the Midway substation. This configuration of poles is acceptable.

## ***TRANSMISSION LINE ROUTE 1A***

Route 1A is a nine-mile line to a new Elk Hills switching station that loops into the existing Midway – Wheeler Ridge 230 kV transmission line. The existing Midway - Wheeler Ridge 230 kV line would be cut at the Elk Hills switching station. For nomenclature purposes, the Midway – Wheeler Ridge 230 kV line would become the Midway – Elk Hills 230 kV line and the Wheeler Ridge – Elk Hills 230 kV line. The Elk Hills switching station will be constructed in a ring configuration with six 230 kV bays. Two bays will connect the Elk Hills switchyard to the Elk Hills switching station, two bays will connect the Wheeler Ridge – Elk Hills 230 kV circuits and two bays will connect the Elk Hills switching station to the Midway substation via the existing 230 kV double circuit line.

The line will cross the California Aqueduct twice, once entering and once exiting the new Elk Hills switching station. For a more detailed description of the line route see the Elk Hills Application for Certification (AFC) pages 3-53 to 3-59 (EHPP 1999a, pages 3-53 to 3-59).

## ***TRANSMISSION LINE ROUTE 1B***

Route 1B is an 8.6-mile line that directly connects the Elk Hills power plant to the Midway substation. The line runs parallel to the existing Midway – Taft 115 kV line for most of the route. An existing 12 kV overhead distribution line may need to be moved underground so that there is room for the Elk Hills – Midway 230 kV line in the Kern county right-of-way. The line will cross the California Aqueduct, State Highway 58 and will encroach on the Wasco Way right-of-way. For a more detailed description of Transmission Line Route B see the Elk Hills AFC page 3-59 (EHPP 1999a, page 3-59).

## ***TRANSMISSION LINE ROUTE 1B VARIATION***

The Route 1B Variation is similar to Route 1B except the Midway-Taft 115 kV line is replaced with a 230 kV line from Elk Hills to Midway. PG&E will determine the conductor size and type, but the applicant expects that a conductor similar to 715 kcmil steel supported aluminum conductor will be used. This alternative will require a new Elk Hills switching station. The switching station will be owned and operated by PG&E at Elk Hills' expense.

The switching station will consist of a six-breaker 230 kV ring bus, a 230/115 kV transformer and a three breaker 115 kV bus. Each of the three turbine generators

at the EHPP will have a generator breaker and an approximately 200 MVA transformer and breaker that will connect to the new switching station. The two 115 kV circuits from Taft substation (one existing and one which may be constructed by PG&E in the future) and the single 115 kV circuit from Occidental Energy of Elk Hills, Inc. (OEHI) Navy 35R plant will connect to the 115 kV bus at the switching station and then to a 150 MVA, 230/115 kV transformer. This will feed a ring bus with six breakers. A full description and picture of this alternative is in the Elk Hills Power Project Addenda to Responses to California Energy Commission Data Request #2, #41 and #42, pages 3 and 4. A drawing of the proposed switching station appears in the System Impact Study Plan for the Elk Hills Power Project contained in the addendum to the data response, page 5 (EHPP 1999c, pages 3 to 5 and 5)

The existing poles between the new Elk Hills switching station and the Midway substation may not be able to carry 230 kV circuits. If all the structures need to be replaced then EHP would prefer to take down the existing structures during off-peak months and replace them with steel poles on a structure for structure basis. If the existing line cannot be taken out of service, then the new structures will be built as closely as possible to the existing structures. In either case, the foundations for the existing lattice towers would remain intact in order to minimize ground disturbance (EHPP 1999c, pages 3 to 5).

Transmission line routes 1A, 1B and the 1B variation are all acceptable from a TSE perspective.

## EXISTING FACILITIES AND RELATED SYSTEMS

The following electric facilities are located near the Elk Hills project site and transmission line routes:

- PG&E's Midway Substation: Connected to PG&E's 115 kV, 230 kV and 500 kV transmission systems;
- PG&E's Midway-Santa Maria 115 kV transmission line;
- PG&E's Midway-Taft 115 kV transmission line;
- PG&E's Taft –Elk Hills 69 kV line.
- PG&E/ California Department of Water Resources' Midway-Wheeler Ridge 230 kV line.

The proposed line routes cross several roads as well as the California Aqueduct. Line crossings may be required in and around the Midway substation. Condition of Certification **TSE 1-g** requires that line crossings be coordinated with the line owner and comply with the owners standards. Major road crossings include State Highway 58, Wasco Way, and Tupman Road (Elk Hills 1999a, pages 3-53 to 3-60).

## **SYSTEM RELIABILITY**

### ***INTRODUCTION***

A system reliability study is performed to determine the affects of connecting a new power plant to the existing electric grid. The study should not only identify impacts, but also ways that negative impacts can be minimized or eliminated. Any new transmission facilities, or downstream facilities, required for connection to the grid. The system impact study for all three transmission line alternatives has been completed by PG&E, and the study finds that there is no need for downstream facilities for Routes 1A or 1B. However, the study finds that additional transformer capacity at the Taft substation is needed for the Route 1B Variation. For all three transmission line alternatives it will be necessary for the Elk Hills project to participate in the existing Path 15 remedial action scheme (RAS) and a new Midway 500/230 kV RAS. Based on its review of the PG&E study the Cal-ISO has given its preliminary interconnection approval. The Cal-ISO will give its final approval to the project after reviewing the Detailed Facilities Study (Cal-ISO 1999c, pages 1-4).

The Cal-ISO proposed a tariff that would have assigned responsibility for certain incremental occurrences of intra-zonal congestion to new generators. The Federal Energy Regulatory Commission (FERC) rejected this tariff and directed the Cal-ISO to reconvene a stakeholder process to redesign the interconnection policy. This originally proposed tariff was called the “Advanced Congestion Cost Mitigation” solution to intra-zonal congestion. The tariff would have required the project owner to mitigate certain qualifying occurrences of intra-zonal congestion as a condition to connecting to the Cal-ISO controlled grid. The options for this mitigation included upgrading overloaded facilities, the construction of new facilities, curtailment, or absorbing congestion costs assigned to the new generation by paying others to curtail. The PG&E System Impact Study for the EHPP did not identify any occurrences of intra-zonal congestion with the addition of the La Paloma Generating Project, Sunrise Cogeneration and Power Project and EHPP.

Additional 115/70 kV transformer capacity at the Taft substation, and all the RAS applications identified by the Cal-ISO have been recommended by staff and the Cal-ISO as conditions of certification for the project. The Cal-ISO will provide testimony on the Preliminary Facilities Study and Interim Detailed Facilities Study Status Report and will provide conclusions and findings in the Energy Commission’s hearings.

### ***SYSTEM RELIABILITY STUDY***

A system reliability evaluation determines whether the new project would cause thermal overloads, voltage violations (voltages too high or low), and/or electric system instability (excessive oscillations). In addition to the above analysis, studies are performed to verify that sufficient reactive power (see Definition of Terms) is available. The reliability evaluation must be conducted for all credible “emergency” conditions. Emergency conditions could include the loss of a single or double circuit line, the loss of a transformer or generator, or a combined loss of these facilities. A System Impact Study is conducted in advance of potential system changes, such as

the addition of the EHPP into the system, in order to prevent criteria violations. The criteria used in this evaluation include the WSCC Planning Criteria, NERC Planning Standards and applicable Cal-ISO reliability criteria.

Power delivered from the EHPP to the existing transmission network in all three route options will impact power flows on existing transmission lines and substations in the Kern county region. The primary effects of the EHPP will be on the Midway substation and the transmission network's ability to move power from the north to the south during heavy load periods and from the south to north during light load periods. The PG&E System Impact Study for EHPP included the La Paloma Power Project producing 1,048 MW and the Sunrise Cogeneration and Power Project producing 338 MW. Power flow studies analyzed the affects of the EHPP on line flows for three cases (EHPP 1998c, page 6) as follows:

- 170. Heavy summer 2001: this case is based on the WSCC full-loop 2001 Heavy Summer case.
- 171. Light winter 2001: this case is based on the full-loop Light Winter WSCC case.
- 172. Heavy spring 2001: this case is based on the WSCC 2001 full-loop Heavy Spring case.

To fully comply with NERC's reliability criteria, "extreme contingency" analysis must be conducted, but is not presently available. Such analysis is required by reliability criteria not to identify facility upgrades or new facilities, but rather to identify necessary mitigation consisting of operational measures such as RAS. These studies will be included in a Detailed Facilities Study. The Cal-ISO will make its final determination based on the Detailed Facilities Study.

Short circuit analyses are conducted to assure that breaker ratings are sufficient to withstand high levels of current during a fault (such as when a line touches the ground). The acceptability of breaker ratings can also be determined during the compliance phase; it need not be done during the AFC process. Condition of Certification **TSE 1-b** has been provided to ensure that breaker ratings are adequate. The PG&E study for the EHPP did not find the need for replacement of any breakers. A more refined short circuit analysis will be included in the Detailed Facilities Study.

Conformance verification with reliability criteria and interconnection standards will be assessed in the Commission's Compliance and Monitoring Process (see Conditions of Certification **TSE-1, -2 and -3**). Staff's proposed conditions of certification require a Detailed Facilities Study including a description of RAS and an executed Interconnection Agreement between Elk Hills and PG&E. As a practical matter staff anticipates that the Detailed Facilities Study and approval by the Cal-ISO will be available near the end of the siting process.

## ALTERNATIVES

Elk Hills has analyzed three potential line routes and is seeking certification for all of them. Each of the routes has been described in the Transmission System Engineering Project Description.

## CUMULATIVE IMPACTS

There is insufficient data to fully evaluate cumulative impacts on the transmission system. Three other projects, La Paloma, Sunrise, and the Morro Bay Power Plant Project (Morro Bay) <sup>1</sup>, located in the same general area, have filed AFCs with the Energy Commission. Staff expects one more project, the Midway-Sunset Power Project (Midway-Sunset), will file an AFC later this year prior to issuance of staff's FSA. Finally, the Pastoria Power Project (Pastoria) AFC was filed in December 1999, and while it is not electrically located in the same area, it may affect the transmission system in the region <sup>2</sup>.

The effect of Morro Bay in addition to La Paloma, Sunrise and EHPP was assessed in sensitivity analysis performed as part of the PG&E System Impact Study for EHPP. This analysis found that, while intra-zonal congestion may occur with the addition of Morro Bay, no additional transmission facilities or RAS applications (other than those already identified without Morro Bay) were required in order to meet reliability criteria.

Both the Sunrise and Elk Hills projects have described interconnection options that loop into the Midway-Wheeler Ridge 230 kV transmission line that is co-owned by PG&E and the California Department of Water Resources. If the projects use this option, a remedial action scheme will be implemented under specific conditions (EHPP 1999a, AFC Informational Review).

## FACILITY CLOSURE

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### INTRODUCTION

The parallel operation of generating stations is controlled, in part by CPUC Rule 21. This rule and standard utility practices for interconnecting a generating unit provide for the participating transmission owner (PTO) to have control of breakers and disconnect switches where the outlet line terminates (the Midway substation) and general control over the interconnected generators. Prior to construction and interconnection of a generating unit, the PTO reviews and comments on the plans and specifications for the power plant and termination equipment that are important to safe and reliable parallel operation <sup>3</sup> and inspects the interconnection facilities. Contractual provisions may be developed to provide backup, or other power service, and codify procedures to be followed during parallel operation. Before generating stations are permitted to bid into the Cal-PX and be dispatched by the Cal-ISO, generator standards must be met and the generating station must commit

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<sup>1</sup> Power generated at Morro Bay connects to the Northern California grid directly through the Midway and Gates substations.

<sup>2</sup> The proposed Pastoria Power Project will connect electrically into the southern California transmission network. The Pastoria substation is part of a radial network that delivers power from Southern California Edison's northern hydroelectric plants to loads in southern California.

<sup>3</sup> As an example, the PTO has control over the generating unit breakers so that only when the PTO's line crews have completed maintenance, for instance, and are clear of the line or other facilities, could the unit reclose into the system. The PTO in this instance is PG&E.

to comply with instructions of the Cal-ISO dispatchers. All participating generators must sign a Participating Generator Agreement (Cal-ISO 1998a, Cal-ISO 1998b). Procedures for planned, unexpected temporary closure and unexpected permanent closure must be developed or verified to facilitate effective communication and coordination between the generating station owner, the PTO and the Cal-ISO to ensure safety and system reliability.

CPUC General Order 95, Rule 31.6 requires that “lines or portions of lines permanently abandoned shall be removed by their owners so that such lines shall not become a public nuisance or a hazard to life or property.” Condition of certification **TSE-1c** requires compliance with this rule.

The ability of the above LORS to reasonably assure safe and reliable conditions, in the event of facility closure, was evaluated for three scenarios:

## **PLANNED CLOSURE**

This type of closure occurs in a planned and orderly manner such as at the end of its useful economic or mechanical life or due to gradual obsolescence. Under such circumstances, the requirement for the owner to provide a closure plan 12 months prior to closure, in conjunction with applicable LORS, is considered sufficient to provide adequately for safety and reliability. For instance, a planned closure provides time for the owner to coordinate with the PTO to assure (as one example) that the PTO’s system will not be closed into the outlet thus energizing the project substation. Alternatively, the owner may coordinate with the PTO to maintain some power service via the outlet line to supply critical station service equipment or other loads <sup>4</sup>.

## **UNEXPECTED TEMPORARY CLOSURE**

This unplanned closure occurs when the facility is closed suddenly and/or unexpectedly for a short term due to unforeseen circumstances such as a natural or other disaster or emergency. During such a closure the facility cannot insert power into the utility system. Closures of this sort can be accommodated by establishment of an on-site contingency plan (see General Conditions Including Compliance Monitoring and Closure Plan).

## **UNEXPECTED PERMANENT CLOSURE**

This unplanned closure occurs when the project owner abandons the facility. This is considered to be a permanent closure. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned. An on-site contingency plan, that is in place and approved by the CPM prior to the beginning of commercial operation of the facilities, will be developed to assure safety and reliability (see General Conditions Including Compliance Monitoring and Closure Plan).

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<sup>4</sup> These are examples; many more exist.

## CONCLUSIONS AND RECOMMENDATIONS

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### CONCLUSIONS

Based on the Cal-ISO's assessment, interconnection of the Elk Hills project via alternative Routes 1A and 1B meets applicable reliability criteria if Elk Hills participates in the existing Path 15 RAS and a new Midway 500/230 kV RAS. No downstream facilities are required for Routes 1A or 1B. The Route 1B variation also meets applicable reliability criteria if EHPP participates in the Path 15 and Midway 500/230 kV RAS and if additional 115/70 kV transformer capacity is provided at Taft substation.

The power plant switchyard and the facilities required for transmission Routes 1A, 1B and 1B variation will comply with applicable LORS upon implementation of the recommended conditions of certification.

### RECOMMENDATIONS

Staff proposes the following conditions of certification to insure system reliability and conformance with LORS.

### CONDITIONS OF CERTIFICATION

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**TSE-1** The project owner shall ensure that the design, construction and operation of the proposed transmission facilities will conform to requirements listed below. The substitution of Compliance Project Manager (CPM) approved "equivalent" equipment and equivalent substation configurations is acceptable.

173. The Elk Hills project 230 kV substation shall include busses in a ring configuration or a breaker and a half scheme.
174. Breakers and bus in the power plant switchyard and other switchyards where it's appropriate shall be sized to comply with a short circuit analysis.
175. Conductors shall be sized to reliably accommodate the power transfer.
176. The power plant switchyard, outlet line and termination shall meet or exceed the requirements CPUC General Order 95.
177. One of the three transmission line route and termination alternatives shall be constructed.
178. Termination facilities at the Midway substation shall comply with applicable Cal-ISO and PG&E interconnection standards (PG&E Interconnection Handbook and CPUC Rule 21).
179. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.
180. The applicant shall provide a Detailed Facilities Study including a description of remedial action scheme sequencing and timing and an executed Facility



Interconnection Agreement for the Elk Hills project transmission interconnection with PG&E. The Detailed Facilities Study and Interconnection Agreement shall be coordinated with the Cal-ISO and shall be in accordance with the Cal ISO's comments on the Elk Hills Preliminary Facilities Study, the Preliminary Facilities Study for Elk Hills Power Project Addendum and the Interim System Impact Study Status Report.

181. The applicant shall ensure that the 115/70 kV transformer capacity at Taft substation is sufficient to comply with Cal-ISO, WSCC and NERC reliability criteria.

**Verification:** At least 60 days prior to start of construction of transmission facilities, the project owner shall submit to the CPM for approval, electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements 1(a) through 1(i) above. The Detailed Facilities Study and executed interconnection agreement shall concurrently be provided. Substitution of equipment and substation configurations shall be identified and justified by the project owner for CPM approval.

**TSE-2** The project owner shall inform the CPM of any impending changes, which may not conform to the requirements 1(a) through 1(i) of **TSE-1**, and have not received CPM approval, and request approval to implement such changes. A detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change shall accompany the request. Construction involving changed equipment or substation configurations shall not begin without prior written approval of the changes by the CPM.

**Verification:** At least 60 days prior to construction of transmission facilities, the project owner shall inform the CPM of any impending changes which may not conform to requirements of **TSE-1** and request approval to implement such changes.

**TSE-3** The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM approved changes thereto, to ensure conformance with CPUC GO-95 and CPUC Rule No. 21 and these conditions. In case of non-conformance, the project owner shall inform the CPM in writing, within 10 days, of discovering such non-conformance and describe the corrective actions to be taken.

**Verification:** Within 60 days after synchronization of the project, the project owner shall transmit to the CPM an engineering description(s), and one-line drawings of the "as-built" facilities, signed and sealed by the registered electrical engineer in charge. A statement attesting to conformance with CPUC GO-95,

CPUC Rule No. 21, the PG&E Interconnection Handbook, and these conditions shall be concurrently provided.

## REFERENCES

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- Cal-ISO (California Independent System Operator). 1998a. Cal-ISO Tariff Scheduling Protocol, posted April 1998, Amendments 1,4,5,6, and 7 incorporated.
- Cal-ISO (California Independent System Operator). 1998b. Cal-ISO Dispatch Protocol, posted April 1998.
- NERC (North American Electric Reliability Council). 1998. NERC Planning Standards, September 1997.
- WSCC (Western Systems Coordinating Council). 1997. Reliability Criteria, August 1998.
- EHPP (Elk Hills Power Project). 1999a. Application for Certification, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, February 24.
- EHPP (Elk Hills Power Project). 1999c. Response to California Energy Commission (CEC) staff data requests nos. 1-44, Elk Hills Power Project (99-AFC-1). Submitted to the California Energy Commission, August 3, 1999.
- EHPP (Elk Hills Power Project). 1999j. Applicant's comments on the Energy Commission staff's Preliminary Staff Assessment. Submitted to the California Energy Commission, November 22, 1999.
- Cal-ISO, 1999c. Elk Hills Power Project – Cal-ISO's Conclusions and Preliminary Findings. Submitted to the California Energy Commission, October 28, 1999.

## DEFINITION OF TERMS

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<b>ACSR</b>	Aluminum cable steel reinforced. A composite conductor made up of a steel core surrounded by aluminum wire.
<b>Ampacity</b>	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.
<b>Ampere</b>	The unit of current flowing in a conductor.
<b>Bundled</b>	Two wires, 18 inches apart.
<b>Bus</b>	Conductors that serve as a common connection for two or more circuits.
<b>Conductor</b>	The part of the transmission line (the wire) which carries the current.
<b>Congestion Management</b>	Congestion management is a scheduling protocol, which provides that dispatched generation and transmission loading (imports), will not violate criteria.
<b>Emergency Overload</b>	See Single Contingency. This is also called an L-1.
<b>Kcmil or kcm</b>	Thousand circular mil. A unit of the conductor's cross sectional area, when divided by 1,273, the area in square inches is obtained.
<b>Kilovolt (kV)</b>	A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.
<b>L-1</b>	The outage of a single circuit.
<b>Megavar</b>	One megavolt ampere reactive.
<b>Megavars</b>	Mega-volt-Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.
<b>Megavolt ampere (MVA)</b>	A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, and divided by 1000.
<b>Megawatt (MW)</b>	A unit of power equivalent to 1,341 horsepower.
<b>Normal Operation/ Normal Overload</b>	When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.
<b>N-1 Condition</b>	See Single Contingency. Also called an L-1.
<b>Outlet</b>	Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.
<b>Power Flow Analysis</b>	A power flow analysis is a forward looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers and other equipment and system voltage levels.
<b>Reactive Power</b>	Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.
<b>Remedial Action Scheme (RAS)</b>	A remedial action scheme is an automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.
<b>SF6</b>	Sulfur hexafluoride is an insulating medium.
<b>Single Contingency</b>	Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.
<b>Solid dielectric cable</b>	Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.

<b>Thermal rating</b>	See ampacity.
<b>TSE</b>	Transmission System Engineering.
<b>Undercrossing</b>	A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.
<b>Underbuild</b>	A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

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# GENERAL CONDITIONS INCLUDING COMPLIANCE MONITORING AND CLOSURE PLAN

Testimony of Nancy Tronaas

## INTRODUCTION

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The project General Conditions Including Compliance Monitoring and Closure Plan (Compliance Plan) has been established as required by Public Resources Code, section 25532. The plan provides a means for assuring that the facility is constructed, operated and closed in conjunction with air and water quality, public health and safety, environmental and other applicable regulations, guidelines, and conditions adopted or established by the California Energy Commission (Energy Commission) and specified in the written decision on the Application for Certification or otherwise required by law.

The Compliance Plan is composed of the following elements:

182. General conditions that:

- set forth the duties and responsibilities of the Compliance Project Manager (CPM), the project owner, delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes; and
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission approved conditions; and
- establish requirements for facility closure plans.

183. Specific conditions of certification:

- Specific conditions of certification that follow each technical area contain the measures required to mitigate any and all potential adverse project impacts associated with construction, operation and closure to an insignificant level. Each specific condition of certification also includes a verification provision that describes the method of verifying that the condition has been satisfied.

## **GENERAL CONDITIONS OF CERTIFICATION**

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### **COMPLIANCE PROJECT MANAGER (CPM) RESPONSIBILITIES**

A CPM will oversee the compliance monitoring and shall be responsible for:

- ensuring that the design, construction, operation, and closure of the project facilities is in compliance with the terms and conditions of the Commission Decision;
- resolving complaints;
- processing post-certification changes to the conditions of certification, project description, and ownership or operational control;
- documenting and tracking compliance filings; and,
- ensuring that the compliance files are maintained and accessible.

The CPM is the contact person for the Energy Commission and will consult with appropriate responsible agencies and the Energy Commission staff when handling disputes, complaints and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal required by a condition of certification requires CPM approval, it should be understood that the approval would involve all appropriate staff and management.

The Commission has established a toll free compliance telephone number of **1-800-858-0784** for the public to contact the Commission about power plant construction or operation-related questions, complaints or concerns.

### ***PRE-CONSTRUCTION AND PRE-OPERATION COMPLIANCE MEETING***

The CPM may schedule pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. The purpose of these meetings will be to assemble both the Energy Commission's and the project owner's technical staff to review the status of all pre-construction or pre-operation requirements contained in the Energy Commission's conditions of certification to confirm that they have been met, or if they have not been met, to ensure that the proper action is taken. In addition, these meetings shall ensure, to the extent possible, that Energy Commission conditions will not delay the construction and operation of the plant due to oversight or inadvertence and to preclude any last minute, unforeseen issues from arising.

### ***ENERGY COMMISSION RECORD***

The Energy Commission shall maintain as a public record, in either the Compliance file or Docket file, for the life of the project (or other period as required):



- all documents demonstrating compliance with any legal requirements relating to the construction and operation of the facility;
- all monthly and annual compliance reports filed by the project owner;
- all complaints of noncompliance filed with the Energy Commission; and,
- all petitions for project or condition changes and the resulting staff or Energy Commission action taken.

## **PROJECT OWNER RESPONSIBILITIES**

It is the responsibility of the project owner to ensure that the general compliance conditions and the conditions of certification are satisfied. The general compliance conditions regarding post-certification changes specify measures that the project owner must take when requesting changes in the project design, compliance conditions, or ownership. Failure to comply with any of the conditions of certification or the general compliance conditions may result in reopening of the case and revocation of Energy Commission certification, an administrative fine, or other action as appropriate.

## **ACCESS**

The CPM, responsible Energy Commission staff, and delegate agencies or consultants, shall be guaranteed and granted unrestricted access to the power plant site, related facilities, project-related staff, and the records maintained on site, for the purpose of conducting audits, surveys, inspections, or general site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time.

## **COMPLIANCE RECORD**

The project owner shall maintain project files on-site or at an alternative site approved by the CPM, for the life of the project. The files shall contain copies of all “as-built” drawings, all documents submitted as verification for conditions, and all other project-related documents for the life of the project, unless a lesser period is specified by the conditions of certification.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files.

## **COMPLIANCE VERIFICATIONS**

A cover letter from the project owner or authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the involved condition(s) of certification by condition number and include a brief description of the subject of the submittal.** The project owner shall also identify those submittals **not** required by a condition of certification with a statement such as: “This submittal is for information only and is not required by a specific condition of certification.” When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal.

The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether such condition was satisfied by work performed by the project owner or an agent of the project owner.

All submittals shall be addressed as follows:

**Compliance Project Manager  
California Energy Commission  
1516 Ninth Street (MS-2000)  
Sacramento, CA 95814**

If the project owner desires Energy Commission staff action by a specific date, they shall so state in their submittal and include a detailed explanation of the effects on the project if this date is not met.

Each condition of certification is followed by a means of verification. The verification describes the Energy Commission's procedure(s) to ensure post-certification compliance with adopted conditions. The verification procedures, unlike the conditions, may be modified, as necessary by the CPM, and in most cases without full Energy Commission approval.

Verification of compliance with the conditions of certification can be accomplished by:

- reporting on the work done and providing the pertinent documentation in monthly and/or annual compliance reports filed by the project owner or authorized agent as required by the specific conditions of certification;
- appropriate letters from delegate agencies verifying compliance;
- Energy Commission staff audit of project records; and/or
- Energy Commission staff inspection of mitigation and/or other evidence of mitigation.

## ***COMPLIANCE REPORTING***

There are two different compliance reports that the project owner must submit to assist the CPM in tracking activities and monitoring compliance with the terms and conditions of the Commission Decision. During construction, the project owner or authorized agent will submit Monthly Compliance Reports. During operation, an Annual Compliance Report must be submitted. These reports, and the requirement for an accompanying compliance matrix, are described below. The majority of the conditions of certification require that compliance submittals be submitted to the CPM in the monthly or annual compliance reports.

## ***COMPLIANCE MATRIX***

A compliance matrix is to be submitted by the project owner to the CPM along with each monthly and annual compliance report. The compliance matrix is intended to

provide the CPM with the current status of compliance conditions in a spreadsheet format. The compliance matrix must identify:

- the technical area,
- the condition number,
- a brief description of the verification action or submittal required by the condition,
- the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.),
- the expected or actual submittal date,
- the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable, and
- the compliance status for each condition (e.g., “not started”, “in progress” or “completed date”).

Completed or satisfied conditions do not need to be included in the compliance matrix after they have been identified as completed/satisfied in at least one monthly or annual compliance report.

### ***MONTHLY COMPLIANCE REPORT***

During construction of the project, the project owner or authorized agent shall submit Monthly Compliance Reports within 10 working days after the end of each reporting month. Monthly Compliance Reports shall be clearly identified for the month being reported. The reports shall contain at a minimum:

- a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;
- documents required by specific conditions to be submitted along with the Monthly Compliance Report. Each of these items must be identified in the transmittal letter, and should be submitted as attachments to the Monthly Compliance Report;
- an initial, and thereafter updated, compliance matrix which shows the status of all conditions of certification (fully satisfied and/or closed conditions do not need to be included in the matrix after they have been reported as closed);
- a list of conditions which have been satisfied during the reporting period, and a description or reference to the actions which satisfied the condition;
- a list of any submittal deadlines that were missed accompanied by an explanation and an estimate of when the information will be provided;
- a cumulative listing of any approved changes to conditions of certification;
- a listing of any filings with, or permits issued by, other governmental agencies during the month;

- a projection of project compliance activities scheduled during the next two months. The project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance conditions of certification;
- a listing of the month's additions to the on-site compliance file;
- any requests to dispose of items that are required to be maintained in the project owner's compliance file; and
- a listing of complaints, notices of violation, official warnings, and citations received during the month; a description of the resolution of any complaints which have been resolved, and the status of any unresolved complaints.

The first Monthly Compliance Report is due the month following the Energy Commission business meeting date that the project was approved, unless the otherwise agreed to by the CPM. The first Monthly Compliance Report shall include an initial list of dates for each of the events identified on the Key Events List. The Key Events List is found at the end of this section.

### ***ANNUAL COMPLIANCE REPORT***

After the air district has issued a Permit to Operate, the project owner shall submit Annual Compliance Reports instead of Monthly Compliance Reports. The reports are for each year of commercial operation and are due to the CPM each year at a date agreed to by the CPM. Annual Compliance Reports shall be submitted over the life of the project unless otherwise specified by the CPM. Each Annual Compliance Report shall identify the reporting period and shall contain the following:

- an updated compliance matrix which shows the status of all conditions of certification (fully satisfied and/or closed conditions do not need to be included in the matrix after they have been reported as closed);
- a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;
- documents required by specific conditions to be submitted along with the Annual Compliance Report. Each of these items must be identified in the transmittal letter, and should be submitted as attachments to the Annual Compliance Report;
- a cumulative listing of all post-certification changes approved by the Energy Commission or cleared by the CPM;
- an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;
- a listing of filings made to, or permits issued by, other governmental agencies during the year;
- a projection of project compliance activities scheduled during the next year;
- a listing of the year's additions to the on-site compliance file, and

- an evaluation of the on-site contingency plan for unexpected facility closure, including any suggestions necessary for bringing the plan up to date [see General Conditions for Facility Closure addressed later in this section]; and
- a listing of complaints, notices of violation, official warnings, and citations received during the year; a description of the resolution of any complaints which have been resolved, and the status of any unresolved complaints.

### ***REPORTING OF COMPLAINTS, NOTICES, AND CITATIONS***

Prior to the start of construction, the project owner must send a letter to property owners living within one mile of the project notifying them of a telephone number to contact project representatives with questions, complaints or concerns. If the telephone is not staffed 24 hours per day, it shall include automatic answering, with date and time stamp recording. The telephone number shall be posted at the project site and easily visible to passersby during construction and operation.

In addition to the monthly and annual compliance reporting requirements described above, the project owner shall report and provide copies of all complaint forms, notices of violation, notices of fines, official warnings, and citations, within 10 days of receipt, to the CPM. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE** conditions of certification. All other complaints shall be recorded on the following form:

**NON-NOISE COMPLAINT RESOLUTION FORM**  
**ELK HILLS POWER PROJECT:**  
**AFC Number: 99-AFC-1**

**COMPLAINT LOG NUMBER** \_\_\_\_\_

Complainant's name and address:

Phone number:

Date and time complaint received:

Indicate if by telephone or in writing (attach copy if written):

Date of first occurrence:

Description of complaint (including dates, frequency, and duration):

Findings of investigation by plant personnel:

Indicate if complaint relates to violation of a CEC requirement:

Date complainant contacted to discuss findings:

Description of corrective measures taken or other complaint resolution:

Indicate if complainant agrees with proposed resolution:

If not, explain:

Other relevant information:

If corrective action necessary, date completed:

Date first letter sent to complainant: \_\_\_\_\_ (copy attached)

Date final letter sent to complainant: \_\_\_\_\_ (copy attached)

This information is certified to be correct.

Plant Manager's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(Attach additional pages and supporting documentation, as required.)

## ***CONFIDENTIAL INFORMATION***

Any information, which the project owner deems confidential shall be submitted to the Energy Commission's Docket with an application for confidentiality pursuant to Title 20, California Code of Regulations, section 2505(a). Any information, which is determined to be confidential, shall be kept confidential as provided for in Title 20, California Code of Regulations, section 2501 et. seq.

## ***DEPARTMENT OF FISH AND GAME FILING FEE***

Pursuant to the provisions of Fish and Game Code Section 711.4, the project owner shall pay a filing fee in the amount of eight hundred and fifty dollars (\$850). The payment instrument shall be provided to the Commission's Project Manager at the time of project certification and shall be made payable to the California Department of Fish and Game. The Commission's Project Manager will submit the payment to the Office of Planning and Research at the time of filing of the notice of decision pursuant to Public Resources Code Section 21080.5.

## **FACILITY CLOSURE**

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### **INTRODUCTION**

At some point in the future, the project will cease operation and close down. At that time, it will be necessary to ensure that the closure occurs in such a way that public health and safety and the environment are protected from adverse impacts. Although the project setting for this project does not appear, at this time, to present any special or unusual closure problems, it is impossible to foresee what the situation will be in 30 years or more when the project ceases operation. Therefore, provisions must be made which provide the flexibility to deal with the specific situation and project setting which will exist at the time of closure. LORS pertaining to facility closure are identified in the sections dealing with each technical area. Facility closure will be consistent with LORS in effect at the time of closure.

There are at least three circumstances in which a facility closure can take place, planned closure, unexpected temporary closure and unexpected permanent closure.

### ***PLANNED CLOSURE***

This planned closure occurs at the end of a project's life, when the facility is closed in an anticipated, orderly manner, at the end of its useful economic or mechanical life, or due to gradual obsolescence.

### ***UNEXPECTED TEMPORARY CLOSURE***

This unplanned closure occurs when the facility is closed suddenly and/or unexpectedly, on a short-term basis, due to unforeseen circumstances such as a natural disaster, or an emergency.

## ***UNEXPECTED PERMANENT CLOSURE***

This unplanned closure occurs if the project owner closes the facility suddenly and/or unexpectedly, on a permanent basis. This includes unexpected closure where the owner remains accountable for implementing the on-site contingency plan. It can also include unexpected closure where the project owner is unable to implement the contingency plan, and the project is essentially abandoned.

## **GENERAL CONDITIONS FOR FACILITY CLOSURE**

### ***PLANNED CLOSURE***

In order that a planned facility closure does not create adverse impacts, a closure process, that will provide for careful consideration of available options and applicable laws, ordinances, regulations, standards, and local/regional plans in existence at the time of closure, will be undertaken. To ensure adequate review of a planned project closure, the project owner shall submit a proposed facility closure plan to the Energy Commission for review and approval at least twelve months prior to commencement of closure activities (or other period of time agreed to by the CPM). The project owner shall file 120 copies (or other number of copies agreed upon by the CPM) of a proposed facility closure plan with the Energy Commission.

The plan shall:

- identify and discuss any impacts and mitigation proposed to address significant adverse impacts associated with proposed closure activities and to address facilities, equipment, or other project related remnants that will remain at the site;
- identify a schedule of activities for closure of the power plant site, transmission line corridor, and all other appurtenant facilities constructed as part of the project;
- identify any facilities or equipment intended to remain on site after closure, the reason, and any future use; and
- address conformance of the plan with all applicable laws, ordinances, regulations, standards, local/regional plans in existence at the time of facility closure, and applicable conditions of certification.

Also, in the event that there are significant issues associated with the proposed facility closure plan's approval, or the desires of local officials or interested parties are inconsistent with the plan, the CPM shall hold one or more workshops and/or the Commission may hold public hearings as part of its approval procedure.

In addition, prior to submittal of the proposed facility closure plan, a meeting shall be held between the project owner and the Commission CPM for the purpose of discussing the specific contents of the plan.

As necessary, prior to, or during the closure plan process, the project owner shall take appropriate steps to eliminate any immediate threats to public health and



safety or the environment, but shall not commence any other closure activities, until Commission approval of the facility closure plan is obtained.

### ***UNEXPECTED TEMPORARY CLOSURE***

In order to ensure that public health and safety and the environment are protected in the event of an unexpected temporary facility closure, it is essential to have an on-site contingency plan in place. The on-site contingency plan will help to ensure that all necessary steps to mitigate public health and safety, and environmental impacts, are taken in a timely manner.

The project owner shall submit an on-site contingency plan for CPM review and approval. The plan shall be submitted no less than 60 days (or other time agreed to by the CPM) prior to commencement of commercial operation. The approved plan must be in place prior to commercial operation of the facility and shall be kept at the site at all times.

The project owner, in consultation with the CPM, will update the on-site contingency plan as necessary. The CPM may recommend revisions to the on-site contingency plan over the life of the project. In the annual compliance reports submitted to the Energy Commission, the project owner will review the on-site contingency plan, and recommend changes to bring the plan up to date. Any changes to the plan must be approved by the CPM.

The on-site contingency plan shall provide for taking immediate steps to secure the facility from trespassing or encroachment. In addition, for closures of more than 90 days (unless other arrangements are agreed to by the CPM), the plan shall provide for removal of hazardous materials and hazardous wastes, draining of all chemicals from storage tanks and other equipment and the safe shutdown of all equipment (also see specific conditions of certification for the technical areas of Hazardous Materials Management and Waste Management).

In addition, consistent with requirements under unexpected permanent closure addressed below, the nature and extent of insurance coverage, and major equipment warranties must also be included in the on-site contingency plan. In addition, the status of the insurance coverage and major equipment warranties must be updated in the annual compliance reports.

In the event of an unexpected temporary closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, e-mail, etc., within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of circumstances and expected duration of the closure.

If the CPM determines that a temporary closure is likely to be permanent, or for a duration of more than twelve months, a closure plan consistent with that for a planned closure shall be developed and submitted to the CPM within 90 days of the CPM's determination (or other period of time agreed to by the CPM).

## **UNEXPECTED PERMANENT CLOSURE**

The on-site contingency plan required for unexpected temporary closure shall also cover unexpected permanent facility closure. All of the requirements specified for unexpected temporary closure shall also apply to unexpected permanent closure.

In addition, the on-site contingency plan shall address how the project owner will ensure that all required closure steps will be successfully undertaken in the unlikely event of abandonment.

In the event of an unexpected permanent closure, the project owner shall notify the CPM, as well as other responsible agencies, by telephone, fax, e-mail, etc., within 24 hours and shall take all necessary steps to implement the on-site contingency plan. The project owner shall keep the CPM informed of the status of all closure activities.

A closure plan consistent with that for a planned closure shall be developed and submitted to the CPM within 90 days of the permanent closure (or other period of time agreed to by the CPM).

## **DELEGATE AGENCIES**

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To the extent permitted by law, the Energy Commission may delegate authority for compliance verification and enforcement to various state and local agencies that have expertise in subject areas where specific requirements have been established as a condition of certification. If a delegate agency does not participate in this program, the Energy Commission staff will establish an alternative method of verification and enforcement. Energy Commission staff reserves the right to independently verify compliance.

In performing construction and operation monitoring of the project, the Energy Commission staff acts as, and has the authority of, the Chief Building Official (CBO). The Commission staff retains this authority when delegating to a local CBO. Delegation of authority for compliance verification includes the authority for enforcing codes, the responsibility for code interpretation where required, and the authority to use discretion as necessary, in implementing the various codes and standards.

Whenever an agency's responsibility for a particular area is transferred by law to another entity, all references to the original agency shall be interpreted to apply to the successor entity.

## **ENFORCEMENT**

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The Energy Commission's legal authority to enforce the terms and conditions of its Decision is specified in Public Resources Code, sections 25534 and 25900. The Energy Commission may amend or revoke the certification for any facility, and may

impose a civil penalty for any significant failure to comply with the terms or conditions of the Commission Decision.

Moreover, to ensure compliance with the terms and conditions of certification and applicable laws, ordinances, regulations, and standards, delegate agencies are authorized to take any action allowed by law in accordance with their statutory authority, regulations, and administrative procedures.

## **NONCOMPLIANCE COMPLAINT PROCEDURES**

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Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1230 et. seq., but in many instances the noncompliance can be resolved by using the informal dispute resolution process. Both the informal and formal complaint procedure, as described in current State law and regulations, are described below. They shall be followed unless superseded by current law or regulations.

### **INFORMAL DISPUTE RESOLUTION PROCEDURE**

The following procedure is designed to informally resolve disputes concerning interpretation of compliance with the requirements of this compliance plan. The project owner, the Energy Commission, or any other party, including members of the public, may initiate this procedure for resolving a dispute. Disputes may pertain to actions or decisions made by any party including the Energy Commission's delegate agents.

This procedure may precede the more formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1230 et. seq., but is not intended to be a substitute for, or prerequisite to it. This informal procedure may not be used to change the terms and conditions of certification as approved by the Energy Commission, although the agreed upon resolution may result in a project owner, or in some cases the Energy Commission staff, proposing an amendment.

The procedure encourages all parties involved in a dispute to discuss the matter and to reach an agreement resolving the dispute. If a dispute cannot be resolved, then the matter must be referred to the full Energy Commission for consideration via the complaint and investigation process. The procedure for informal dispute resolution is as follows:

### **REQUEST FOR INFORMAL INVESTIGATION**

Any individual, group, or agency may request the Energy Commission to conduct an informal investigation of alleged noncompliance with the Energy Commission's terms and conditions of certification. All requests for informal investigations shall be made to the designated CPM.

Upon receipt of a request for informal investigation, the CPM shall promptly notify the project owner of the allegation by telephone and letter. All known and relevant information of the alleged noncompliance shall be provided to the project owner and

to the Energy Commission staff. The CPM will evaluate the request and the information to determine if further investigation is necessary. If the CPM finds that further investigation is necessary, the project owner will be asked to promptly investigate the matter and within seven working days of the CPM's request, provide a written report of the results of the investigation, including corrective measures proposed or undertaken, to the CPM. Depending on the urgency of the noncompliance matter, the CPM may conduct a site visit and/or request the project owner to provide an initial report, within forty-eight hours, followed by a written report filed within seven days.

## **REQUEST FOR INFORMAL MEETING**

In the event that either the party requesting an investigation or the Energy Commission staff is not satisfied with the project owner's report, investigation of the event, or corrective measures undertaken, either party may submit a written request to the CPM for a meeting with the project owner. Such request shall be made within fourteen days of the project owner's filing of its written report. Upon receipt of such a request, the CPM shall:

- immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;
- secure the attendance of appropriate Energy Commission staff and staff of any other agency with expertise in the subject area of concern as necessary;
- conduct such meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner; and
- after the conclusion of such a meeting, promptly prepare and distribute copies to all in attendance and to the project file, a summary memorandum which fairly and accurately identifies the positions of all parties and any conclusions reached. If an agreement has not been reached, the CPM shall inform the complainant of the formal complaint process and requirements provided under Title 20, California Code of Regulations, section 1230 et. seq.

## **FORMAL DISPUTE RESOLUTION PROCEDURE-COMPLAINTS AND INVESTIGATIONS**

If either the project owner, Energy Commission staff, or the party requesting an investigation is not satisfied with the results of the informal dispute resolution process, such party may file a complaint or a request for an investigation with the Energy Commission's General Counsel. Disputes may pertain to actions or decisions made by any party including the Energy Commission's delegate agents. Requirements for complaint filings and a description of how complaints are processed are in Title 20, California Code of Regulations, section 1230 et. seq.

The Chairman, upon receipt of a written request stating the basis of the dispute, may grant a hearing on the matter, consistent with the requirements of noticing provisions. The Commission shall have the authority to consider all relevant facts involved and make any appropriate orders consistent with its jurisdiction (Title 20, California Code of Regulations, sections 1232 - 1236).

## **POST CERTIFICATION CHANGES TO THE COMMISSION DECISION: AMENDMENTS, STAFF CHANGES AND VERIFICATION CHANGES**

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The project owner must petition the Energy Commission, pursuant to Title 20, California Code of Regulations, section 1769, to 1) delete or change a condition of certification; 2) modify the project design or operational requirements; 3) transfer ownership or operational control of the facility; or 4) change a condition verification requirement.

A petition is required for amendments and for insignificant (staff) changes. For verification changes, a letter from the project owner is sufficient. In all cases, the petition or letter requesting a change should be submitted to the Commission's Docket in accordance with Title 20, California Code of Regulations, section 1209. The criteria that determine which type of change process applies are explained below.

### **AMENDMENT**

A proposed change will be processed as an amendment if it involves a change to the requirement or protocol (and in some cases the verification) portion of a condition of certification, an ownership or operator change, or a potential significant environmental impact.

### **INSIGNIFICANT STAFF CHANGE**

The proposed change will be processed as an insignificant staff change if it does not require changing the language in a condition of certification, does not have a potential significant environmental impact, and will not cause the project to violate laws, ordinances, regulations or standards.

### **VERIFICATION CHANGE**

The proposed change will be processed as a verification change if it involves only the language in the verification portion of the condition of certification. This procedure can only be used to change verification requirements that are of an administrative nature, usually the timing of a required action. In the unlikely event that verification language contains technical requirements, the proposed change must be processed as an amendment.

## KEY EVENT LIST

PROJECT \_\_\_\_\_ DATE ENTERED \_\_\_\_\_

DOCKET # \_\_\_\_\_ PROJECT MANAGER \_\_\_\_\_

<b><i>EVENT DESCRIPTION</i></b>	<b><i>DATE ASSIGNED</i></b>
Date of Certification	
Start of Construction	
Completion of Construction	
Start of Operation (1 <sup>st</sup> Turbine Roll	
Start of Rainy Season	
End of Rainy Season	
Start T/L Construction	
Complete T/L Construction	
Start Fuel Supply Line Construction	
Complete Fuel Supply Line Construction	
Start Rough Grading	
Complete Rough Grading	
Start of Water Supply Line Construction	
Complete Water Supply Line Construction	
Start Implementation of Erosion Control Measures	
Completion of Erosion Control Measures	

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## GLOSSARY OF TERMS AND ACRONYMS

### A

A Ampere

AAL All aluminum (electricity conductor)

AADT Annual Average Daily Traffic

AAQS Ambient Air Quality Standards

AC Alternating Current

ACEC Area of Critical Environmental Concern

ACGIH American Conference of Government and Industrial Hygienists

ACE (U.S.) Army Corps of Engineers

ACSR Aluminum Covered Steel Reinforced (electricity conductor)

AERA

AFC Application for Certification

AFY acre-feet per year

AHM Acutely Hazardous Materials

AIHA American Industrial Hygienists Association

ANSI American National Standards Institute

APCD Air Pollution Control District

APCO Air Pollution Control Officer

AQMP Air Quality Management Plan

ARB Air Resources Board

ARCO Atlantic Richfield Company

ASAE American Society of Architectural Engineers

ASHRAE American Society of Heating Refrigeration & Air Conditioning Engineers

ASME American Society of Mechanical Engineers

ATC Authority to Construct

AWS American Welding Society

### B

BACT Best Available Control Technology

BARCT Best Available Retrofit Control Technology

bbl barrel

BCF billion cubic feet

Bcfd billion cubic feet per day

b/d      barrels per day

BO      Biological Opinion

BLM      (U.S.) Bureau of Land Management

BR      Biennial Report

BRMIMP Biological Resources Mitigation and Monitoring Plan

Btu      British thermal unit

**C**

CAA      (U.S.) Clean Air Act

CAAQS California Ambient Air Quality Standards

CalEPA California Environmental Protection Agency

Cal-OSHA California Occupational Safety and Health Administration

Cal-PX      California Power Exchange

Caltrans California Department of Transportation

CAPCOA California Air Pollution Control Officers Association

CARB      California Air Resources Board

CATEF California Toxic Emissions Factors

CBC      California Building Code

CBO      Chief Building Official

CCAA      California Clean Air Act

CCR      California Code of Regulations

CDF      California Department of Forestry

CDFG      California Department of Fish and Game

CEERT Coalition for Energy Efficiency and Renewable Technologies

CEM      Continuous Emissions Monitoring

CEQA      California Environmental Quality Act

CERCLA Comprehensive Environmental Response Compensation and Liability Act

CESA      California Endangered Species Act

CFB      Circulating Fluidized Bed

CFCs      Chloro-fluorocarbons

cfm      cubic feet per minute

CFR      Code of Federal Regulations

cfs      cubic feet per second

CLUP      Comprehensive Land Use Plan

CNEL      Community Noise Equivalent Level

CNLM      Center for Natural Lands Management

CO      Carbon Monoxide

CO2      Carbon Dioxide

COC      Condition of Certification

CPM      Compliance Project Manager



CPUC California Public Utilities Commission

CRTR Cultural Resources Technical Report

CT Combustion Turbine  
Current Transformer

CTG Combustion Turbine Generator

CUPA Certified Unified Program Agency

CURE California Unions for Reliable Energy

**D**

dB decibel

dB(A) decibel on the A scale

DC Direct Current

DCS Distributed Control System

DCTL Double Circuit Transmission Line

DEIR Draft Environmental Impact Report

DEIS Draft Environmental Impact Statement

DHS (California) Department of Health Services

DISCO Distribution Company

DOC Determination of Compliance

DOE (U.S.) Department of Energy

DOG (California) Department of Oil and Gas

DSM Demand Side Management

DTC Desert Tortoise Council

DTSC (CalEPA) Department of Toxic Substances Control

DWR (California) Department of Water Resources

**E**

EA Environmental Assessment

EDF Environmental Defense Fund

EDR Energy Development Report

EEGL Emergency Response Planning Guidelines

EFS&EPD Energy Facilities Siting and Environmental Protection Division

EHPP Elk Hills Power Project

EIA (U.S.) Energy Information Agency

EIR Environmental Impact Report

EIS Environmental Impact Statement

EJ Environmental Justice

ELFIN Electric Utility Financial and Production Simulation Model

EMF Electromagnetic Field

EPA (U.S.) Environmental Protection Agency

EPA-ARI (U.S.) Environmental Protection Agency-Accidental Release Information Program

EPRI Electric Power Research Institute

ER Electricity Report

ERC Emission Reduction Credit {offset}

ERNS Emergency Response Notification System

ERPG Emergency Response Planning Guidelines

ESA Endangered Species Act (Federal)  
Environmental Site Assessment

ETSR Energy Technologies Status Report

## F

FAA (U.S.) Federal Aviation Administration

FBE Functional Basis Earthquake

FCAA Federal Clean Air Act

FCC Federal Communications Commission

FE Federally (listed) Endangered

FEIR Final Environmental Impact Report

FERC Federal Energy Regulatory Commission

FIP Federal Implementation Plan

FLPMA Federal Land Policy Management Act

FONSI Finding of No Significant Impact

FP (State) Fully Protected

FSA Final Staff Assessment

FT Federally (listed) Threatened

## G

GE General Electric

GEP Good Engineering Practice

GIS Gas Insulated Switchgear  
Geographic Information System

gpd gallons per day

gpm gallons per minute

GW gigawatt

GWh gigawatt hour

## H

H<sub>2</sub>S Hydrogen Sulfide

HCP Habitat Conservation Plan

HHV Higher Heating Value

HRA Health Risk Assessment

HRSG Heat Recovery Steam Generator

HV High Voltage

HVAC Heating, Ventilation and Air Conditioning

## I

IAR Issues and Alternatives Report

IDLH Immediately Dangerous to Life and Health Level

IEA International Energy Agency

IEEE Institute of Electrical & Electronics Engineers

IIPP Injury and Illness Prevention Program

IIR Issues Identification Report

IMPLAN Impact Analysis for Planning

IOU Investor-Owned Utility

IS Initial Study

ISO Independent System Operator

ISCST3 Industrial Source Complex Short-Term model, Version 3

## J

## K

KCFD Kern County Fire Department

KCM thousand circular mils (also KCmil) (electricity conductor)

km kilometer

KOP Key Observation Point

kVkilovolt

KVAR kilovolt-ampere reactive

kW kilowatt

kWe kilowatt, electric

kWh kilowatt hour

kWp peak kilowatt

## L

LAER Lowest Achievable Emission Rate

lbs pounds

lbs/hr pounds per hour

lbs/MMBtu Pounds Per Million British Thermal Units

LORS Laws, Ordinances, Regulations and Standards

LOS Level of Service

## M

m (M) meter, million, mega, milli or thousand

MCE Maximum Credible Earthquake

MCF thousand cubic feet

MCL Maximum Containment Level

MCM thousand circular mil (electricity conductor)

$\mu\text{g}/\text{m}^3$  micro grams (10<sup>-6</sup> grams) per cubic meter

MG milli gauss

mgd million gallons per day

MOU Memorandum of Understanding

MPE Maximum Probable Earthquake

m/s meters per second

MS Mail Station

MVAR megavolt-ampere reactive

MW megawatt (million watts)

MWh megawatt hour

MWp peak megawatt

## **N**

N-1 One transmission circuit out

N-2 Two transmission circuits out

NAAQS National Ambient Air Quality Standards

NAHC Native American Heritage Council

NCR Non-Conformance Report

NEC National Electrical Code

NEPA National Energy Policy Act  
National Environmental Policy Act

NERC National Electric Reliability Council

NESHAPS National Emission Standards for Hazardous Air Pollutants

NIOSH National Institute of Occupational Health and Safety

NMHC nonmethane hydrocarbons

NO nitrogen oxide

NOI Notice of Intention

NO<sub>x</sub> nitrogen oxides

NO<sub>2</sub> nitrogen dioxide

NOP Notice of Preparation (of EIR)

NOV Notice of Violation

NRC National Research Council  
National Response Center

NRDC Natural Resources Defense Council

NSPS New Source Performance Standards

NSR New Source Review

## **O**

O<sub>3</sub>Ozone

OASIS Open Access Same-Time Information System

OCB Oil Circuit Breaker

OCSG Operating Capability Study Group

O&M Operation and Maintenance

OLM Ozone Limiting Method

OSHA Occupational Safety and Health Administration (or Act)

## **P**

PAH Polycyclic Aromatic Hydrocarbons

PG&E Pacific Gas & Electric Company

PHC(S) Prehearing Conference (Statement)

PIFUA Federal Powerplant & Industrial Fuel Use Act of 1978

PM Project Manager  
particulate matter

PMPD Presiding Member's Proposed Decision

PM<sub>10</sub> Particulate matter 10 microns and smaller in diameter

PM<sub>2.5</sub> Particulate matter 2.5 microns and smaller in diameter

PPE Personal Protective Equipment

ppb parts per billion

ppm parts per million

ppmvd parts per million by volume, dry

ppt parts per thousand

PSA Preliminary Staff Assessment

PRC (California) Public Resources Code

PSD Prevention of Significant Deterioration

PT Potential Transformer

PTO Permit to Operate  
Participating Transmission Owner

PU per unit

PURPA Federal Public Utilities Regulatory Policy Act of 1978

PV photovoltaic

PX Power Exchange

## Q

QA/QC Quality Assurance/Quality Control

QF Qualifying Facility

## R

RACT Reasonably Available Control Technology

RCRA Resource Conservation and Recovery Act

RDF Refuse Derived Fuel

RE Resident Engineer

RMP Risk Management Plan

ROC Report of Conversation  
Reactive Organic Compounds

ROG Reactive Organic Gas

ROW Right-of-Way

RWQCB Regional Water Quality Control Board

## S

SARA Superfund Amendments and Reauthorization Act of 1986

SB Senate Bill

SCFM standard cubic feet per minute

SCH State Clearing House

SCR Selective Catalytic Reduction

SCTL Single Circuit Transmission Line

SE State (listed) Endangered

SHPO State Office of Historic Preservation

SIC Standard industrial classification

SIP State Implementation Plan

SJVAB San Joaquin Valley Air Basin

SJVUAPCD San Joaquin Valley Unified Air Pollution Control District

SMP Safety Management Plan

SNCR Selective Noncatalytic Reduction

SNG Synthetic Natural Gas

SO<sub>2</sub> Sulfur Dioxide

SO<sub>x</sub> Oxides of Sulfur

SO<sub>4</sub> Sulfates

SSC Species of Special Concern

ST State (listed) Threatened

STEL Short Term Exposure Limit

STPEL Short Term Public Emergency Limit(s)

STIG Steam Injected Gas Turbine

SWP State Water Project

SWRCB State Water Resources Control Board

## T

TAC Toxic Air Contaminant

Tbtu trillion Btu

TCF trillion cubic feet

TCM Transportation Control Measure

TDS Total Dissolved Solids

TE Transmission Engineering

TEOR Thermally Enhanced Oil Recovery

TL Transmission Line (or lines)

T-Line Transmission Line

TLV Threshold Limit Value

TOG Total Organic Gases

TPD tons per day

TPY tons per year

TS&N Transmission Safety and Nuisance

TSE Transmission System Engineering

TSIN Transmission Services Information Network

TSP Total Suspended Particulate Matter

## U

UBC Uniform Building Code

UDC Utility Displacement Credits

UDF Utility Displacement Factor

UEG Utility Electric Generator

UFC Uniform Fire Code

USC United States Code

USC(A) United States Code (Annotated)

USCOE U.S. (Army) Corps of  
Engineers

USEPA U.S. Environmental Protection  
Agency

USFS U.S. Forest Service

USFWS U.S. Fish and Wildlife Service

USGS U.S. Geological Survey

## **V**

VISCREEN

VOC Volatile Organic Compound(s)

VRM Visual Resource Management

## **W**

W Watt

WAA Warren-Alquist Act

WEPEX Western Energy Power  
Exchange

WHO World Health Organization

WICF Western Interconnection  
Forum

WIEB Western Interstate Energy  
Board

WPLT Western Pluvial Lakes  
Tradition

WRTA Western Region Transmission  
Association

WSCC Western System Coordination  
Council

WSPP Western System Power Pool

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Transmission Line Safety and Nuisance.....	Obed Odoemelum
Hazardous Materials .....	Joe Loyer and Rick Tyler
Waste Management.....	Michael Ringer
Land Use .....	Amanda Stennick
Traffic and Transportation.....	Eric Knight and Rick Tyler
Noise.....	Kisabuli
Visual Resources .....	David Flores
Cultural Resources .....	Roberta Greenwood and Dorothy Torres
Socioeconomics.....	Joe Diamond
Biology .....	Linda Spiegel
Geology and Paleontology.....	Robert Anderson
Facility Design .....	Steve Baker, M. Kisabuli, and Al McCuen
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Glossary of Terms and Acronyms.....	Bert Fegg

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